JPRS-UST-88-006
29 APRIL 1988

Foreign
Broadcast
Information
Service

JPRS Report

Science & Technology

USSR: Science & Technology Policy

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Science & Technology
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International S&T Relations

Regional Issues

Historical Survey of Cost Accounting in Scientific Research

18140203 Moscow PRAVDA in Russian 30 Jan 88 p 2

[Article by G. Lakhtin, doctor of Economic Sciences: "Inertia or Jerk?"]

[Text]**Science, like other aspects of our public life, has become an object of perestroyka. In the past two years much has changed in it: a new system for paying labor has been introduced, many institutes have become part of associations, there are new organizational forms such as intersectoral scientific-technical complexes, sector science is converting to full cost accounting.**

One must assume that these are not simply individual measures, but make up an integral system for managing science and scientific and technical progress, in which general strategic tasks are carried up to higher levels of plan leadership, while partial questions are solved at lower levels, operating independently and with self-financing. Perestroyka strengthens both aspects — centralized and democratic.

Centralization presumes the presence of a center, a main organ directing policies in its sphere. It would seem that there is not a single process in society that needs centralized leadership as much as does scientific and technical progress. This is because it encompasses and penetrates all areas of public production, and must overcome much inertia. However, this inertia is still underestimated. The management of scientific and technical development is splintered. Many authorities lead it or participate independently in its leadership: the USSR State Committee for Science and Technology, the USSR Academy of Sciences, industrial ministries, Minvuz [Ministry of Higher and Secondary Specialized Education]. However, not one of these organizations has become a unifying, effective central organ leading science as a whole and implementing its achievements.

It should not be thought that this means setting up another bureaucratic "office." It involves something else — putting together, in public production, a system not just for producing a specific product, but for developing this production on the basis of new knowledge and technical solutions. It includes those who do research and development, those who think up innovations and introduce them, carry the weight of modernization and those who provide participants with the needed resources. However, this system has no "conductor." His absence, which had previously not been very important, will have a greater effect where academy institutes, VUZ departments and organizations from various ministries participate in intersectoral programs but cannot sign contracts. It is sort of like an orchestra without a conductor.

Obviously, developments will lead to scientific and technical progress being led by a single organ responsible for the technical and economic improvement of public production, concentrating the needed resources and, most importantly, directing participants in progress. Recent measures such as the expansion of the USSR GKNT's functions, the transfer of inventors activities to it and putting it in charge of intersectoral scientific-technical complexes are evidence of centralization in the management of scientific and technical progress . The entire course of organizational development in Soviet science is evidence of the steady increase in the level of its leadership and the tendency to go to the state level of management.

However, no leadership organ can follow the thousands of subjects, innovations and models being tested. At the implementation level there should be a smoothly operating mechanism linking science to production, based upon mutual advantage, interest and responsibility. The centralized leadership sets the goals, the necessary level of technical improvement, the cost accounting system is entrusted with determining the way to attain these. At the start of this year a degree on converting scientific organizations to full cost accounting and self-financing went into effect. This means that each scientific research institute and each design office should earn their bread from their own dvelopments and from specific clients.

Our Soviet science has been in existence for 70 years. It makes sense to turn to its history and to lessons in its development. This applies completely to previously introduced cost accounting in science. This was first done in the beginning of the 1930's. Enterprises were entrusted with signing contracts with institutes in their sector, while the institutes were to work on the subjects ordered. This procedure did not exist very long. The reasons are not difficult to explain. Cost accounting was not at all compatible with the administrative-command system of leadership which had triumphed during that period as it presumes economically independent partners with equal rights entering into contractual relations and having a choice about it. The relative influence of centralized financing began to grow quickly and in a few years it became the only source.

Cost accounting was introduced for the second time in 1961. I will explain it with an common example. Assume that you purchased a coat from an artel, and while it is being made you pay part of the agreed upon sum. On the designated day you make your last payment and are given it, wrapped up in paper. Whether it pleases you or not, you will not get anything different, as it is already completely paid for. The object of the contract was the completion of work, and not its result, you didn't pay for the coat, but for the process of sewing. There is another nuance here: if you immediately find a flaw in the coat, but work completion is "a cat in a sack", only practical use shows how good it is.

Let us continue the analogy. You, the customer, select the material and the style, suitable to your interests and financial possibilities. The master tailor suggests something unique, at the level of the best world standards (naturally not free). However, you do not intend to pay money for creative searches, let it be simpler and less expensive, grey, but up to date, the present day necessities will be satisfactory. Thus, striving to meet world standards contradicts mercantile interests: it requires increasingly complex expensive intersectoral developments, leading to revolutionary changes in equipment and techniques. The cost accounting in those days loaded even central institutes with subjects which plant laboratories could handle. By the end of the 1960's central financing again began to increase — this time in the form of ministry funds for the development of science and technology.

In contrast to previous decrees, the new one talks about the conversion to full cost accounting. Obviously, more than simply all work being done under contact, this involves the thoroughness with which cost accounting principles are implemented and the conversion from formal cost accounting, which consists of the commodity-monetary exercise of administrative relations, to real cost accounting. The end result of cost accounting does not consist so much in receiving money under contractual conditions (this is only its prerequisite) nor in incomes exceeding expenses (this is the consequence), but in the construction of a system of interests, indicators and monetary receipts which is capable of providing good results through economic resources.

The main field for applying economic methods is the interface between science and production. The main danger is the mechanical transfer to this field of principles and approaches appropriate to cost accounting in the material sphere. The main task is to so construct the cost accounting mechanism so that it includes all the specific features of linkages between science and production.

One such feature is that efforts are applied and expenditures made in areas other than where economically significant results are obtained. A plant which saves on materials and labor obtains the direct advantage from the reduction in production costs. On the other hand, an institute which does work resulting in savings in materials and labor, creates a useful effect far from itself, which is obtained by the plant introducing it. The work finished by the institute has still not been completed for society. On the contrary, the path to a technical solution found by the institute has only begun. This path is very long. No matter how we try to reduce it, it is necessary to take into account the great time lag between outlays and final results.

Taking these peculiarities into account makes it possible to decide about some features of the cost accounting mechanism needed.

The first question — what will be the object of contracts or payments, the process or the result, performing the work or the completed innovation? If it is the process, then we return to the cost accounting of 1961, which does not provide incentives for high quality results, reductions in work time, or cost savings (the customer pays a price calculated by the unit doing the work). Live shows that this variant assures the financial welfare of both sides, without real progress in production. The alternative is "manufacture for sale", in which an institute does not offer a customer a service, but a commodity an innovation. This stimulates what is most important — the efficiency and quality of the scientific product. If a commodity is no good nobody will buy it.

However, a development takes quite a lot of time, during which the developer has to somehow exist. In order to do it on his own account, he must have an account. The following question arises: how should an institute's day to day activities be financed? In some cases this can be done through advances, while in other through bank credits to provide circulating capital.

Thus, we are trying to pay for a commodity, i.e. for a result. However, the question immediately arises, when and at what stage? Will this be a direct product of the developer's work (a report, set of drawings), or an operating experimental model, or the actual introduction and its effects, or the final result — new technical and economic levels for production attained through its introduction? As a rule, at the time a development is completed the real value of a scientific and technical product is not evident. How many thousands of reports, containing not only conclusions promising all sorts of things, but also calculations of expected effects, lie uselessly on shelves! For a product of labor to be a commodity, it must not only be produced for sale, but have use value and utility. These appear as it moves towards the end of the chain: the further the movement the more "commodified" the product becomes. In other words, it is with the practical embodiment, or at least the practical demonstration of something that one can confidently say that "it works", and thus deserves to be paid for. If there were any previous payments, they can be considered advances. Obviously, it makes sense to embody in law the procedure for demonstrating the real effects and determining the basis for contractual payments.

One should not ignore ambiguity in the understanding of final results. The developer of a product or technical solution will try to turn it into a commodity as quickly as possible in order to recover his costs. Society, however, needs the final result from production, covering costs at all stages. It turns out that a narrowly understood self-supporting production [samookupayemost] stands in contradiction to final results.

Having made clear that payments should be made, we now must be concerned about setting the price. It is contractual, i.e. an object of free contract. At the same

time it is assumed that it is linked to efficiency and quality. If not, cost accounting looses all meaning, as it is not an end in itself, but a means for accelerating scientific and technical progress. If payment is for the development process, then prices will inevitably be based on estimated costs, covering developers outlays. Such a price is set prior to the beginning of work, but as a product's efficiency is revealed when the work is completed, it is impossible to link the two. If the developer "makes a commodity" on his own account, he has the right to set the price, linked not to his costs, but to the expected effects. However, at the time the price is set the real value has not been established. Apparently, there must be a change in the customary form of prices. They should be scales in which the size of payment will be linked to previously stipulated qualitative characteristics agreed upon with the customer. The implementation of cost accounting encounters a clear contradiction in that the object of economic relations should be an individual development, but the allocator of resources still remains an organization, i.e. an institute or design office. The project manager cannot dispose of money allocated for the project. The incoming resources are put into a common pot which, as before, will remain at the disposal of the institute director, and not the project manager.

Maintaining and preserving the institute remains the director's practical concern. Guideline materials clearly presume one of two extreme cases: either the institute is completely supported by contracts, and it only has to catch up, or it or it does not have any and should close down. In real life one can expect something in between — a shortage of contracts. Then a dilemma arises — find any work, even the smallest job, or curtail payments to personnel in an amount equal to the shortfall or reduce the institute's staff. Even to release people of little use is a painfully difficult task, but in this case one must release fully skilled and capable people, who are only guilty of the customers being stingy. Therefore, there are more likely to be attempts to keep them "floating" and to maintain the institute as a single unit, getting the necessary contracts, but if this does not succeed, raising the price of existing ones so as to provide people with pay, if not with work.

Another question arises here. Why are workers in science doomed to wait for customers from outside? Where is their creative initiative? Why don't they themselves propose projects which industry or managers would grab up joyfully and pay appropriately? Creative initiative is still not a commodity. It will become one only when transformed into a technical solution. Until this one has to work on one's own account. Consequently, the cost accounting mechanism should provide resources for exploratory research undertaken on the researchers' initiative. This is for the creation of a reserve of work and is not according to residual principles, but according to normatives. That is, it should not be residual after all orders are taken, but a previously set reserve making it possible to test ideas, inventions and hypotheses. Finally, the nature of the linkages between science and production changes fundamentally. Science has grown up. While previously it involved the number of projects at an institute, now it is the number of institutes on a project. Revolutionary directions, made up of radical technical and technological transformations, are showing ever greater power. They are born during programs conducted by cooperating organizations, in which industry is not a customer, but an active participant.

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Candidate Members of Ukrainian Academy of Sciences

18140188 Kiev PRAVDA UKRAINY in Russian 1 Jan 88 p 3

[Article "From the Ukrainian SSR Academy of Sciences"]

[Excerpt] The Ukrainian SSR Academy of Sciences, in conformity with Section 21 of its Charter, reports the names of the candidate full members (academicians) of the Ukrainian SSR Academy of Sciences and corresponding members of the Ukrainian SSR Academy of Sciences, who were nominated on the basis of the notice in the newspapers RADYANSKA UKRAYINA and PRAVDA UKRAINY of 6 October 1987 by the councils of scientific institutions and higher educational institutions, by state and public organizations, and by full members and corresponding members of the academies of sciences:

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Danilyuk, Ivan Ilich—corresponding member of the Ukrainian SSR Academy of Sciences.

Dzyadyk, Vladislav Kirillovich—corresponding member of the Ukrainian SSR Academy of Sciences.

Yermolyev, Yuriy Mikhaylovich—corresponding member of the Ukrainian SSR Academy of Sciences.

Samoylenko, Anatoliy Mikhaylovich—corresponding member of the Ukrainian SSR Academy of Sciences.

Samofalov, Konstantin Grigoryevich—corresponding member of the Ukrainian SSR Academy of Sciences.

Sergiyenko, Ivan Vasilyevich—corresponding member of the Ukrainian SSR Academy of Sciences.

Sharkovskiy, Aleksandr Nikolayevich—corresponding member of the Ukrainian SSR Academy of Sciences.

Yushchenko, Yekaterina Logvinovna—corresponding member of the Ukrainian SSR Academy of Sciences.

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Grigorenko, Yaroslav Mikhaylovich—corresponding member of the Ukrainian SSR Academy of Sciences.

Yefremov, Ernest Ivanovich—corresponding member of the Ukrainian SSR Academy of Sciences.

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Svechnikov, Sergey Vasilyevich—corresponding member of the Ukrainian SSR Academy of Sciences.

Tovstyuk, Korney Denisovich—corresponding member of the Ukrainian SSR Academy of Sciences.

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Berezovskiy, Vadim Akimovich—doctor of medical sciences, professor.

Bykorez, Anatoliy Iosifovich—doctor of medical sciences, professor.

Yelskaya, Anna Valentinovna—doctor of biological sciences, professor.

Kavsan, Vadim Moiseyevich—doctor of biological sciences.

Kordyum, Vitaliy Arnoldovich—doctor of biological sciences.

Kudinov, Stanislav Aleksandrovich—doctor of biological sciences, professor.

Kurskiy, Mikhail Dmitriyevich—doctor of biological sciences, professor.

Maleyev, Vladimir Yakovlevich—doctor of physical mathematical sciences, professor.

Matselyukh, Bogdan Pavlovich—doctor of biological sciences, professor.

Melnichuk, Dmitriy Alekseyevich—doctor of biological sciences, professor.

Moybenko, Aleksey Alekseyevich—doctor of medical sciences, professor.

Ostashko, Fedor Ivanovich—doctor of biological sciences, professor.

Reznikov, Aleksandr Grigoryevich—doctor of medical sciences, professor.

Rudenko, Anatoliy Yefimovich—doctor of medical sciences.

Sukhodub, Leonid Fedorovich—doctor of physical mathematical sciences.

Tronko, Nikolay Dmitriyevich—doctor of medical sciences.

Tsutsayeva, Alla Aleksandrovna—doctor of medical sciences, professor.

The General Biology Department

Vasser, Solomon Pavlovich—doctor of biological sciences.

Dudka, Irina Aleksandrovna—doctor of biological sciences, professor.

Kordyum, Yelizaveta Lvovna—doctor of biological sciences, professor.

Masyuk, Nikolay Trofimovich—doctor of biological sciences, professor

Tarabrin, Viktor Pavlovich—doctor of biological sciences, professor.

Cherevchenko, Tatyana Mikhaylovna—doctor of biological sciences.

Chopik, Vladimir Ivanovich—doctor of biological sciences, professor.

The Economics Department

Beschastnyy, Leonid Konstantinovich—doctor of economic sciences.

Dolishniy, Maryan Ivanovich—doctor of economic sciences, professor.

Doroguntsov, Sergey Ivanovich—candidate of economic sciences.

Zastavnyy, Fedor Dmitriyevich—doctor of geographical sciences, professor.

Kanygin, Yuriy Mikhaylovich—doctor of economic sciences, professor.

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Achievements of Estonian Physicists

18140161 Tallinn SOVETSKAYA ESTONIYA in Russian 6 Dec 87 pp 1-2

[Article by SOVETSKAYA ESTONIYA correspondents Kh. Moppel and K. Liyv (Tartu): "Science and Inspiration"; photographs not reproduced]

[Text] Not that long ago physicists were considered the antipodes of lyric poets: at one pole is the world of the spirit, which towers above everyday life, at the other are dry calculations and instruments. And near them are people who in some way are similar to these instruments and formulas. With time our attitude toward physicists has changed. Indeed, the modern physicist is both a romantic and a dreamer, only he stands firmly with two feet on the ground, and his fantasy begins with precise indicators on instruments.

Here is the "excimer laser complex".... Specialists explained to us that this is the latest scientific research equipment for optical spectroscopy in the vacuum-ultraviolet and visible regions of the spectrum and is being used in the laboratory of low temperatures of the Institute of Physics of the Estonian SSR Academy of Sciences. In the USSR a new important direction—laser wide-band spectral instrument making—was developed on its basis. This equipment was both developed and produced at Tartu and Tallinn institutions of the Estonian SSR Academy of Sciences. Recently the report arrived: its developers, who participated in the exhibition "70 Years Under the Banner of Great October," had been commended all in all by 40(!) medals of the Exhibition of National Economic Achievements.

In our photograph at the complex are Tiyt Lepasaar, chief project designer of the Tartu Affiliate of the special design bureau of the Estonian SSR Academy of Sciences (in the foreground); Corresponding Member of the USSR Academy of Sciences Peeter Saari, director of the institute (in the center at the right); Candidate of Technical Sciences Virgo Mikhkelsoo, head of the laboratory

of laser technology (on the left); and Doctor of Physical Mathematical Sciences Reyn Kink, head of the laboratory of low temperatures (in the background).

Today there is a reason to speak about the successes of the institute: physicists are celebrating an "intermediate" anniversary—40 years since the time, when the first academic institute, which took upon itself the development of a traditional science for the city—physics—was founded in Tartu. At different times it had different names: the Institute of Physics, Mathematics, and Mechanics, later the Institute of Physics and Astronomy. Now it is the Institute of Physics of the Estonian SSR Academy of Sciences.

During these years the institute became a center of the elaboration of a number of most urgent scientific problems, and this brought it a good reputation not only in its homeland. Tartu physicists are being invited to leading scientific centers of the world to share the results of their research. Our republic has already more than once been the site of the holding of international symposiums of physicists. They could begin the reports on a number of their achievements with the words "For the first time in the world...," although physicists themselves do not like to stress this. A rare year in the chronicle of the institute has not been marked by a high prize or medal....

The Estonian SSR State Prize of this year came to the laboratory of physics of ion crystals. Although, if we are to be precise, only a portion of the authors of the work are from this laboratory. The other portion of them work at Tartu State University. On the day, when we made this photo report, they were together. In the photograph: the collective of winners (from left to right) Tiyt Kyarner (the Institute of Physics), Nataliya Lushchik (the Institute of Physics), Viktor Seman (Tartu State University), Yevgeniy Vasilchenko (the Institute of Physics), Fedor Savikhin (the Institute of Physics), Khenn Kyaembre (the Institute of Physics), Lembit Pung (Tartu State University), Yukhan Kolk (Tartu State University), and Aleksandr Lushchik (Tartu State University).

The traditions of such scientific cooperation are as old as the institute. The majority of staff members of the institute are pupils of Tartu State University. Especially close ties have formed with the chairs of experimental physics and solid-state physics. The latter settled within the walls of the institute and now has been renamed the chair of laser optics.

The winners of this year for more than 15 years studied together new luminescent materials on both the theoretical and the practical levels. In theory they succeeded in approaching a more thorough understanding of the causes of radiation action on various materials. In practice radiation-monitoring instruments of a new class for monitoring the dose of radiation of man were developed. It is impossible to overestimate their significance in the modern disturbing world.

The times, when it was possible to make a discovery in science if only...by means of an apple that had fallen, have receded into the past.... Our contemporaries need the most accurate and most complex devices in order to make if only a small step forward in the labyrinth of science. Probably only accountants and materially responsible people know how many of these instruments there are at the Institute of Physics. It was clear to us: people feel restricted from the abundance of equipment. However, the physicists are not losing heart, they are finding a way out themselves.

Kh. Yygi, scientific secretary of the institute, took us to the section for experiments, which was installed...under the building. What was previously called a "basement" in the most usual sense of the word, now is in all respects modern scientific laboratories, which were established for the most part by the efforts of their own scientific associates.

"These premises were put into operation just now, on the occasion of the 70th anniversary of October," Khugo Rudolfovich relates. "Such a socialist obligation was assumed here, and we fulfilled it."

True, here we regretted that there is no opportunity to give to the newspaper color photographs so that the reader could see himself the spectacle of the operating laser. They amplified for us: this is not simply a laser, but an original picosecond laser complex, which was developed at the institute.

Two complexes—the spectroscopy of crystals and picosecond holography—were located in the new premises. Here is the laboratory table. It weighs 3 tons and was installed on a base that was specially built for it. The surface of the table has small round holes of different diameter—thus it is easy to attach various equipment to the table. Here there are computers and displays. A new series of studies of ultra high-speed molecular processes has already been started in conformity with its own spectrochronographic method, which was developed at the institute.

Mainly young physicists work in the new laboratories. One of them is Tynu Reynot, whom you see at the spectrochronograph.

Valdur Tiyt has managed the laboratory of instrument making for 27 years now. Today the products of this laboratory are popular not only with their own people. What they do not make here! In the names of many instruments there is the root "meter"—these are radiometric equipment, spectrometric equipment.... It is like "bread" for physicists.

The masters without fail will show everyone, who looks into this realm of equipment, their latest creation—the laboratory pulse synchrotron. And we see a powerful round unit with an innumerably large number of wires....

Valdur Tiyt explains: this is a source of synchronous radiation, the spectrum of which extends from infrared to far vacuum-ultraviolet radiation. And this radiation is not usual—in a beam, but planar radiation, which is reminiscent of a sheet of paper. The electron in the "drum" revolves with a speed of 1 billion cycles a second....

The synchrotron already is ready to work for science, and in our photograph scientific associates of the laboratory Anatoliy Kuznetsov (on the right) and Elar Vilt make regular entries in the journal of observations. While other colleagues sit nearby, over drawings, tables, and calculations. Perhaps, a new instrument is already being born on display screens, in the memory of computers, and under the pen of scientists. But here it is not customary to speak about a child who has not yet been born....

The Institute of Physics of the Estonian SSR Academy of Sciences has entered the 41st year of its history. Early in the morning the lights go on in the windows of the five-story building of science on the outskirts of Tartu. An ordinary day, which is full of labor and inspiration, is beginning.

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Cost Accounting at Zhdanovtyazhmash Production Association

18140166 Moscow EKONOMICHESKAYA GAZETA in Russian No 50, Dec 87 p 14

[Article by A. Fedotkin, chief of the laboratory of the economics and organization of production of the Zhdanovtyazhmash Production Association: "What Is Your Contribution to the Cost Accounting Revenue?"]

[Text] Our scientific research, planning, design, and technological institute (NIPKTI) is a part of the Zhdanovtyazhmash Production Association. Its basic task is to ensure the increase of the technical level of production and the updating and the development of new highly efficient products.

Great tasks face the collective. In 1988 alone it is planned to update 17 percent of the products of machine building; to increase the output of the most important types of products, which correspond to the world technical level, in the total production volume to 96.5 percent; to decrease the cost of the output being produced by 5.5 million rubles. We have to accomplish these tasks under the new conditions of management, when along with production subdivisions the design and technological subdivisions will change over to full cost accounting and self-financing.

Little time remains until the beginning of the year, but not all the economic levers have been properly "adjusted." This pertains, for example, to the material interest in the improvement of the quality and efficiency of the output being produced.

The objective evaluation of the results of the activity of all the participants in the process of the development of new equipment is of great importance in setting up genuine cost accounting. In this matter we already have some experience, which we can share.

It is well known that under the conditions of full cost accounting the profit becomes a generalizing evaluation indicator of the activity of both the association as a whole and its individual subdivisions. In particular, for our institute the amount of the actual saving from the decrease of the cost of the output being produced serves as the indicator of its participation in the formation of the cost accounting revenue. This indicator is reported to all the design, technological, and scientific research divisions. The bonus of developers depends on its fulfillment.

The planning of saving is carried out in five directions: the saving from the introduction of organizational and technical measures; from efficiency proposals and inventions; from advanced know-how; from the scientific organization of labor; and from the fulfillment of scientific research work. For every introduced measure we compile an estimate of the economic impact. We take it into account with the aid of a computer. Thus, from the introduction of borrowed advanced know-how the labor intensity of the production of a part of a petroleum and gasoline tank was reduced and wages were saved. The initial data, the result, the place of introduction, and the developer are entered on the card of the economic efficiency. From the card the data are transferred to the memory of a computer, and the computer for 12 months depending on the actual output of equipment regards the sum as the actual saving.

We keep an account both for the shop, in which the innovation is introduced, and for the developing division. In the shop the saving finds reflection in the indicator "the profit," for the division—"the actual saving."

By means of this system of planning and accounting an equal interest of shops and divisions in the formulation and introduction of measures of scientific and technical progress is created. Moreover, the computer takes into account not only the saving, but also the permitted increase of the cost of the output being produced.

The accounting, which was set up with the aid of the cards of efficiency, makes it possible to evaluate objectively the contribution of each shop and division to the derivation of the profit and accordingly to transfer to them material incentive funds.

I think that everyone will agree that the allotment to the institute and its subdivisions of a material incentive fund subject to the degree of their participation in the overall results of activity under the conditions of cost accounting will increase the interest of every subdivision in the rapid introduction of the achievements of science and technology and the better organization of labor.

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Leningrad Scientists Elected to Academy of Sciences

18140163 Leningrad LENINGRADSKAYA PRAVDA in Russian 30 Dec 87 p 1

[Article under the rubric "Congratulations!": "The New Reinforcement of the Academy"; first paragraph is LENINGRADSKAYA PRAVDA introduction]

[Text] The election to the USSR Academy of Sciences, which concluded the other day in Moscow, was permeated with the spirit of democracy and the aspiration to elect the most talented scientists as members of the academy. At the General Assembly each candidate for full members and corresponding members of the USSR Academy of Sciences was considered with particular, increased demandingness. The news that 4 Leningrad scientists were elected academicians and 16 were elected corresponding members of the USSR Academy of Sciences was all the more gratifying. We congratulate the scientists on the high rating of their scientific achievements and present the new academicians and corresponding members of the USSR Academy of Sciences.

Doctor of Technical Sciences Vasiliy Andreyevich Glukhikh, director of the Scientific Research Institute of Electrophysical Apparatus imeni D.V. Yefremov and winner of the Lenin and USSR State Prizes, was elected a full member of the USSR Academy of Sciences for the Physical Technical Problems of Power Engineering Department. He is one of the leading specialists of the country in the field of high current electrophysics and controlled thermonuclear fusion installations. V.A. Glukhikh is the author of more than 120 scientific publications.

Series of magnetohydrodynamics machines for nuclear power plants and large plants for research in the field of controlled thermonuclear fusion were developed and produced under the supervision of the scientist. Among them are the Alfa, Tokamak-10, Tokamak-15, Angara-15, and other plants.

The scientific activity of V.A. Glukhikh has received extensive recognition in our country. He is chairman of the Scientific Council of the USSR Academy of Sciences for High-Duty Pulse Power Engineering and a member of a number of other scientific councils of the USSR Academy of Sciences.

Professor Igor Sergeyevich Gramberg, who was elected an academician of the USSR Academy of Sciences (the Geology, Geophysics, Geochemistry, and Mining Sciences Department), is in charge of the All-Union Scientific Research Institute of Geology and Mineral Resources of the World Ocean of the USSR Ministry of Geology. He is a prominent researcher in the field of lithology, the geochemistry of sedimentary rocks, and petroleum geology. The research of the scientist, which is distinguished by the depth of analysis of the factual material and the breadth of the generalizations, played a large role, for example, in determining the prospects of the presence of petroleum and gas and selecting the directions of petroleum- and gas-prospecting operations in northern regions of Siberia.

Under the supervision of the scientist the first map of the prospects of the presence of petroleum and gas on the Arctic Shelf of the USSR was compiled and the basic directions of petroleum- and gas-prospecting studies in the Arctic seas were formulated. The scientific works of I.S. Gramberg, which are aimed at the discovery of deposits of petroleum and gas in the northern part of Western Siberia and the solution of other most important national economic problems, received a high rating of the party and government.

The scientific sphere of activity of Professor Vladimir Leonidovich Sviderskiy, director of the Institute of Evolutionary Physiology and Biochemistry of the USSR Academy of Sciences, who was elected an academician of the USSR Academy of Sciences for the Physiology Department, is the neurophysiology of invertebrates. The data obtained by him on the nature of central automatism, which is inherent in the nervous system of invertebrates, are of particular interest. As a result of experiments, which were conducted at the cell level, the scientist succeeded in showing how by means of interconnected neurons, which have specific properties, even such complex forms of behavior of invertebrates as the flight of insects can be controlled.

The research of V.L. Sviderskiy is aiding in the solution of important problems of evolutionary physiology. It is broadening and extending the notions about the means and methods of the evolution of the nervous system of invertebrates and is making it possible to use them as "models" when solving several problems of general neurophysiology.

Professor Igor Dmitriyevich Spasskiy, a Hero of Socialist Labor and winner of the Lenin and USSR State Prizes, who was elected a full member of the USSR Academy of Sciences for the Problems of Machine Building, Mechanics, and Control Processes Department, is one of the leading Soviet specialists and a talented organizer of the production of power engineering complexes. A number of designs of most complex structures of the machine building type were developed under his scientific and technical supervision.

Efficient demands on the amount of equipment, the optimum structure of its control, and fundamentally new methods of increasing its reliability were developed by I.D. Spasskiy and are already being used in designing power machine building complexes. The results of the scientific research of the scientist made it possible for example, without the significant modernization of production capacities and without changes of the technological processes to produce complex machines at the level of the best world models.

The research of the scientist, which made it possible to decrease drastically the labor expenditures and the time of the building of complex structures, is also of great national economic importance.

There were elected as corresponding members of the USSR Academy of Sciences:

Doctor of Physical Mathematical Sciences Viktor Kuzmich Abalakin, director of the Main Astronomical Observatory of the USSR Academy of Sciences. The works of the scientist on the determination of the orbits of small planets and the development of a new system of astronomical constants and other research are well known. He is the winner of the USSR State Prize—for works on the development of a relativistic theory of the motion of the inner planets of the solar system.

Doctor of Physical Mathematical Sciences Professor Maksim Leonidovich Aleksandrov is one of the leading specialists in the country in the field of experimental physics. He is general director of the Scientific and Technical Association of the USSR Academy of Sciences and general director of the Nauchnyye pribory Interbranch Scientific Technical Complex. He is chairman of the Scientific Council for Problems of Instrument Making of the USSR Academy of Sciences.

Professor Vadim Vasilyevich Afrosimov, head of a department of the Physical Technical Institute imeni A.F. Ioffe of the USSR Academy of Sciences, is a specialist in the field of experimental atomic physics and plasma physics. The physics of atomic collisions is one of the directions of his work. He completed in this field a number of basic studies, for which he was awarded the Lenin Prize. He is the winner of the USSR State Prize—for works on the diagnosis of high-temperature plasma.

Yuriy Sergeyevich Vasilyev, rector of Leningrad Polytechnical Institute imeni M.I. Kalinin. A scientist and prominent engineer, he has made a large contribution to the development of domestic power engineering, he is the developer of the general theory of the substantiation of the parameters of large high-power energy complexes within hydroelectric, thermal, and nuclear electric power plants.

Professor Yanush Bronislavovich Danilevich is the head of a department of the All-Union Scientific Research Institute of Electrical Machine Building. A prominent scientist in the field of power electrical machine building, he developed methods of the calculation of the parameters and losses of electromagnetic fields as applied to powerful turbogenerators and hydraulic generators. A large series of works of the scientist is connected with the use of the phenomenon of superconductivity in turbogenerators.

Professor Ilya Sergeyevich Darevskiy, head of a laboratory of the Zoology Institute of the USSR Academy of Sciences, is a prominent zoology scholar and a specialist in the field of the study of amphibians and reptiles. The research of I.S. Darevskiy, which is devoted to various questions of the classification, ecology, zoogeography, evolution, and protection of amphibians and reptiles, has brought him extensive fame in our country and abroad.

Professor Aleksandr Ivanovich Zhamoyda, head of a sector of the All-Union Scientific Research Institute of Geology imeni A.P. Karpinskiy, is a leading researcher in the field of stratigraphy and paleontology, geological cartography and regional geology. Vast experience in geological photographic and map making work has put A.I. Zhamoyda in the rank of the leading specialists of regional geology of the country.

Professor Sergey Georgiyevich Ingevechtomov, dean of the Biology and Soil Science Faculty of Leningrad State University imeni A.A. Zhdanov, is a well-known specialist in the field of general and molecular genetics. The range of his scientific interests encompasses the problems of genetic and cell engineering, ecological genetics, the molecular bases of evolution, and the special genetics of microorganisms and animals.

Doctor of Physical Mathematical Sciences Professor Aleksandr Aleksandrovich Kaplyanskiy, head of a department of the Physical Technical Institute imeni A.F. Ioffe of the USSR Academy of Sciences, is a most prominent specialist in the field of optical semiconductors and dielectrics. He actively participated in the studies of excitons in semiconductors, for which he was awarded the Lenin Prize. He is the winner of the USSR State Prize. He is a member of a number of scientific councils of the USSR Academy of Sciences.

Professor Stanislav Petrovich Merkuryev, rector of Leningrad State University imeni A.A. Zhdanov, is a prominent specialist in the field of mathematical physics and computational physics. His studies of mathematical questions of the quantum problem of scattering for systems of several particles are of great theoretical and practical importance. Their results have found extensive use in atomic and nuclear physics.

Professor Yuriy Viktorovich Natochin, head of a laboratory of the Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov, is a leading specialist in the field of the physiology of the kidney and water-salt

exchange. The study of the membrane-molecular bases of the activity of the kidney is the basic direction of the scientific activity of the scientist.

Doctor of Technical Sciences Vladimir Grigoryevich Peshekhonov is a leading scientist and specialist in problems of the world ocean. For great scientific achievements he was awarded the title of winner of the Lenin Prize.

Professor Nikolay Maksimovich Proskuryakov, rector of the Leningrad Mining Institute imeni G.V. Plekhanov, is a prominent specialist in the field of the working of mineral deposits and the physical processes of mining. He is the author of 150 scientific works, among which there are 12 monographs and textbooks. He is a member of several scientific councils of the USSR Academy of Sciences.

Professor Pavel Pavlovich Rumyantsev, director of the Institute of Cytology of the USSR Academy of Sciences, is one of the most prominent specialists in our country and abroad in the biology of muscle cells and cell cardiology. The comparative studies of the scientist on the cell aspects of the development and regeneration of the heart muscle have acquired world renown.

Aleksandr Aleksandrovich Fursenko, a chief scientific associate of the Leningrad Branch of the Institute of History of the USSR of the USSR Academy of Sciences, is a specialist in general history, who has enriched science with serious works on the history of the United States of the 18th-20th centuries and economic history. In a number of works he developed a typological characterization of the American revolution and the formation of the bourgeois state.

Professor Valeriy Aleksandrovich Shishkin, deputy director of the Institute of History of the USSR of the USSR Academy of Sciences for the Leningrad Branch, is a specialist in USSR history and the author of significant scientific works on the Soviet period. The state and revolutionary activity of V.I. Lenin, the establishment of relations of the USSR with capitalist countries, the defense of Leningrad during 1941-1945, and the criticism of the bourgeois historiography of Soviet society are the basic directions of his research.

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Role of Engineering Services, Cooperatives Under New Conditions
18140181 Moscow NTR: PROBLEMY I RESHENIYA in Russian No 22, 17 Nov-7 Dec 87 p 6

[Article under the rubric "Opinions, Evaluations, Trends": "Engineering Centers and Cooperatives of Scientists"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] A bridge between science and production, a reliable one, with two-way traffic is very nearly the most important problem of scientific and technical progress, which now faces us. In any case, it is possible to come to such a conclusion by examining the editorial mail. Readers not only question or criticize the existing mechanism, but also come forth with quite specific suggestions. We are submitting two of them today for the verdict of readers.

With the appearance of the Law on Individual Labor Activity various cooperatives, including engineering brigades for the rendering of all kinds of services to the population, have begun to be established. This law is a very necessary and useful matter, but, as they say, a coin also has a reverse side. After a 7-hour workday an engineer, in order to earn more, should work another 4-5 hours. As a result his workday increases to 12-13 hours. Since a high quality of the results of labor, which requires the additional exertion of physical and mental energies, is the basic condition of individual labor activity, then, one would like to know, what kind of efficiency is it possible to expect from an specialist at his basic job? Engineering cooperatives, of course, will divert the most talented engineers from state enterprises and, thus, the state sector will again suffer.

The question arises: Why is it impossible to create for the engineer at his main job such working conditions so that he would be satisfied both morally and materially and would work to full effect? For example, at every industrial enterprise and association on the basis of the design, technological, and other divisions it is possible to establish a service of the engineering support of production, in which the most competent specialists, who know how to think analytically, would be included.

This service should gather and analyze the information on innovations in science and technology, which concerns the given sector. It is itself to work with the bank of inventions of the country, invent, and rationalize. New developments (even though applicable only under the specific conditions of the given enterprise) in the area of technology and machine building, plans of the retooling and modernization of production, and so forth, obviously, should become the result. The engineering service should have its own pilot experimental section or shop, in which full-scale models of inventions and efficiency proposals will be materialized. In case of the changeover of the enterprise to full cost accounting and self-financing the engineering service should also become cost accounting.

[Signed] A. Markarov, power engineer

Yerevan

The enlistment of specialists of the highest skill—scientists of the USSR Academy of Sciences—in the solution of specific plant problems, moreover, not only in the sphere of technology, but also in the sphere of management and economics, is very important under the conditions of the changeover of enterprises to cost accounting and self-financing. Indeed, a plant cannot venture to

keep a "full set" of such specialists on salaries. The need for their use is very large. Moreover, it is usually desirable for the plant to ensure the contact of plant specialists with scientists in the shortest time and at a qualitatively high level, which is often difficult to accomplish, since now such operations are performed through third organizations.

This problem can be solved by the establishment at the plant of a scientific and technical cooperative. Then the multistage process of the posing by the plant of tasks for science, the very same process, which requires such efforts on various consultations, settlements, and coordinations, that following them the essence of the problem is often emasculated, will be eliminated. The quality of the solution of the problem will also increase drastically, inasmuch as it will be evaluated by the plant, and not by departmental commissions.

The functions of the cooperative of scientists somehow are the opposite of the functions of "introducing" firms: instead of seeking those who wish to introduce a finished development at their place, it fills the orders of the plant. It seems that these two forms could naturally complement each other.

Of course, so that the cooperative would cope with the posed tasks, full (and not half-hearted) cost accounting and the absence of any bureaucracy whatsoever in relations with the plant and cooperative are necessary.

Let us summarize. At every plant there are problems in the sphere of the economics, technology, and management of production and in the social sphere, which for many years have needed solution; there are highly skilled specialists who are willing to undertake their solution and are capable of solving them; an organizational form of the uniting of the interests of the plant and specialists has been developed—this is the cooperative. And there are specific people, who are willing to attempt to implement the idea in practice—for example, the authors of this letter.

We impatiently wait for responses, and first of all from managers of capital enterprises.

[Signed] V. Davidovich, Yu. Arzhevikin, scientific associates

Moscow

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Official Explains Cooperative Science Center

18140175 Moscow NTR: PROBLEMY I RESHENIYA in Russian No 24 22-31 Dec 87 p 7

[Interview with V. Prosyanik, by G. Sidorova]

[Text] *In Issue No. 7 of this year your paper reported that the country's first cooperative organization for the production introduction of scientific and technical achievements was opened in Kishinev this year. It would be interesting to learn more details about this cooperative's features and potentials, and of course, its results. P. Mikhaylov, engineer Perm*

Our correspondent talked to V. Prosyanik, chief engineer of the "Progress" Intersectoral Cooperative Scientific-Technical Center.

[Question] Vladimir Nikolayevich, is the center engaged only in the introduction of innovations?

[Answer] No. The spectrum of work is quite broad. It includes the development and manufacture of automation and computerization equipment, non-standard equipment, training in functional-cost analysis (FCA) methods and TRIZ [Not further identified], solutions to economic and sociological problems, getting rid of production problems, etc.

We are not sitting around with nothing to do. There are enough orders. We have already completed more than 1 million rubles worth of work. Our customers are instrument builders and TV plants, light industry enterprises and VUZes.

[Question] How are contractual prices determined and what makes up the center's income?

[Answer] We ourselves determine contractual prices by using a special methodology. After the work has been completed, money is entered into the center's bank account. Deductions are made to the state budget, all types of payments are made and the remaining is distributed to funds. We have four: the enterprise development fund, the fund for payments to labor and the sotskultbyt [Social-cultural-personal services] fund.

[Question] What is the reserve fund and what is money from the enterprise development fund spent on?

[Answer] In technical creativity, as in any activity, there is a certain amount of risk. There is work which, in the final account, will not produce results. However, without experimental testing one cannot be sure if the proposed technical solution can be put into practice. This is the work which is financed from the reserve fund.

Resources from the enterprise development fund go to our own promising developments (there are still no customers for them, but later we will be able to offer them as completed solutions). We plan to use these resources to acquire our own equipment.

[Question] Customers come to you even though there are scientific research institutes and design offices. Apparently, the center has some advantages?

[Answer] They usually come to us after they have already been to some institute or design office and could not place their order. Some work is not in the usual profile,

or the deadlines did not suit the customer. Also, we have genuine advantages. We are not interested in stretching out work times and adding on excessive costs (if necessary we make an FCA analysis). The tasks which we have been asked to do do not have to await inclusion in a plan. Work on them is begun immediately.

[Question] How does one become an MKNTs [Intersectoral cooperative scientific-technical center] client?

[Answer] It is very simple. You must place an order, indicating the essentials of the problem, technical conditions and the approximate savings which the customer will obtain if the work is completed.

The center' address is: 277012 Kishinev, Pr. Lenina, 200, room 3. Telephone: 22-13-65.

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Organizational, Personnel Changes Made at Academy of Sciences

18140150c Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 12, Dec 87 pp 126-127

[Article under the rubric "News Items and Information": "Scientific Organizational Decisions of the Presidium of the USSR Academy of Sciences"]

[Text] An affiliate of the Institute of Machine Science imeni A.A. Blagonravov of the USSR Academy of Sciences with an experimental design bureau and a pilot plant was organized in Kuybyshev. The basic directions of the scientific activity of the affiliate were approved.

Doctor of Technical Sciences V.A. Vittikh was appointed acting director of the affiliate of the Institute of Machine Science imeni A.A. Blagonravov in Kuybyshev.

The Northern Expeditionary Base of the Institute of Water Problems of the USSR Academy of Sciences with the rights of a structural subdivision—a laboratory—was organized in Arkhangelsk and its basic tasks were approved. The scientific research work is performed by permanent staff members of the base and by assigned staff members of the subdivisions of the Institute of Water Problems of the USSR Academy of Sciences.

The scientific supervision of the Northern Expeditionary Base of the Institute of Water Problems of the USSR Academy of Sciences was assigned to Corresponding Member of the USSR Academy of Sciences M.G. Khublaryan.

Doctor of Technical Sciences P.V. Nesterov was appointed director of the All-Union Institute of Scientific and Technical Information of the USSR State Committee for Science and Technology and the USSR Academy of Sciences.

Academician V.I. Spitsyn was relieved of the position of director of the Institute of Physical Chemistry of the USSR Academy of Sciences at his own request. V.I. Spitsyn was thanked for many years of fruitful work in the position of director of this institute. Taking into account the outstanding contribution of Academician V.I. Spitsyn to the development of chemical science and the organization of scientific research, he was appointed honorary director of the Institute of Physical Chemistry of the USSR Academy of Sciences.

Doctor of Physical Mathematical Sciences A.P. Zakharov was appointed acting director of the Institute of Physical Chemistry of the USSR Academy of Sciences.

Academician of the Ukrainian SSR Academy of Sciences and the All-Union Academy of Agricultural Sciences imeni V.I. Lenin A.A. Sozinov was relieved of the duties of director of the Institute of General Genetics imeni N.I. Vavilov of the USSR Academy of Sciences in connection with his election as chairman of the Presidium of the Southern Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin. A.A. Sozinov was thanked for the fruitful activity in the position of director of the Institute of General Genetics imeni N.I. Vavilov of the USSR Academy of Sciences.

The temporary fulfillment of the duties of director of the Institute of General Genetics imeni N.I. Vavilov of the USSR Academy of Sciences was assigned to Doctor of Biological Sciences Yu.P. Altukhov, deputy director of the institute.

Doctor of Geological Mineralogical Sciences O.A. Votakh was appointed acting director of the Chita Institute of Natural Resources of the Siberian Department of the USSR Academy of Sciences.

Corresponding Member of the USSR Academy of Sciences G.I. Galaziy was relieved of the duties of director of the Limnology Institute of the Siberian Department of the USSR Academy of Sciences in connection with the expiration of his term of office.

Doctor of Technical Sciences V.V. Moshev was appointed acting director of the Institute of Continuum Mechanics of the Ural Department of the USSR Academy of Sciences.

Doctor of Physical Mathematical Sciences M.-K.M. Magomedov was appointed acting director of the Institute of Geothermal Problems of the Dagestan Affiliate of the USSR Academy of Sciences.

Academician D.M. Gvishiani was relieved of the duties of chairman of the Committee of the USSR Academy of Sciences for Systems Analysis at his own request, while remaining a member of it.

Academician V.S. Mikhalevich was approved as chairman of the Committee of the USSR Academy of Sciences for Systems Analysis.

The publication of the theoretical scientific journal OPTIKA ATMOSFERY of the USSR Academy of Sciences—an organ of the Siberian Department of the USSR Academy of Sciences—is being organized as of 1 January 1988. The basic indicators of the journal OPTIKA ATMOSFERY of the USSR Academy of Sciences were established: the periodicity—12 issues a year, the size of an issue—10.8 publisher's signatures, the price of a copy—1 ruble 30 kopecks, the subscription price for a year—15 rubles 60 kopecks.

The publication of the journal will be carried out by the Radio i svyaz Publishing House of the USSR State Committee for Publishing Houses, Printing Plants, and the Book Trade.

The Siberian Department of the USSR Academy of Sciences was commissioned to submit for the consideration of the Presidium of the USSR Academy of Sciences a proposal on the candidature for the position of editor in chief of the journal, as well as to approve the composition of its editorial board. All the necessary work for the preparation and the assurance of the regular and timely publication of the journal as of January 1988 was assigned to the Institute of Atmospheric Optics of the Siberian Department of the USSR Academy of Sciences.

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Central Construction Administration of USSR Academy of Sciences

18140150b Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 12, Dec 87 pp 124-125

[Article by A.G. Fomin under the rubric "News Items and Information": "The Central Construction Administration of the USSR Academy of Sciences Is 50 Years Old"]

[Text] On 7 August 1987, on the eve of the all-union professional holiday the Day of the Construction Worker a solemn meeting, which was devoted to the 50th anniversary of the Central Construction Administration of the USSR Academy of Sciences [Tsentrakademstroy], was held in Moscow at the Meridian Palace of Culture. The Tsentrakademstroy is one of the oldest specialized construction organizations. Within it there are 11 construction and installation and specialized administrations, 3 plants of construction items, 2 administrations—the mechanization and motor transport administrations, as well as other subdivisions. Skilled construction workers, assemblers, and mechanizers work in the Tsentrakademstroy. In all 7 of its workers have been awarded the titles of winners of the prize of the USSR Council of Ministers, 13 have been awarded the titles of honored construction worker of the RSFSR.

Workers and veterans of the Tsentrakademstroy, prominent scientists, and representatives of party and soviet organs, the USSR State Planning Committee and the USSR State Committee for Construction Affairs, as well as numerous organizations, with which the Tsentrakademstroy has been cooperating for a long time, attended the meeting. G.I. Solovyev, chief of the Tsentrakademstroy, delivered a report. He noted that in past years the Tsentrakademstroy had erected more than 500 large facilities of science with a total area of more than 1 million square meters and apartment houses with a total area of more than 1.5 million square meters. Among these structures are the Scientific Center of Biological Research in Pushchino and the Scientific Center of Physical Research in Troitsk of Moscow Oblast. Among the most difficult scientific complexes in the engineering respect the speaker singled out the press with a force of 50,000 tons for research work, which is the largest in the world, the S-25R synchrotron, and the meson physics accelerator in Troitsk. The Tsentrakademstroy is carrying out the construction of buildings of the Presidium of the USSR Academy of Sciences in Moscow and unique reconstruction and renovation operations in Leningrad.

The organization has highly skilled personnel, an efficient two-level management structure, and considerable reserves for the increase of the technical level of construction under the new conditions. The Tsentrakademstroy is actively introducing new organizational and economic methods of management, including the collective contract, and is implementing a number of important measures on the increase of capacities. The tasks, which were set for the collective by the Presidium of the USSR Academy of Sciences in light of the decisions of the 27th CPSU Congress and the January and June (1987) CPSU Central Committee Plenums, are exceptionally important, and the time of their fulfillment is the shortest.

Vice President of the USSR Academy of Sciences Academician K.V. Frolov, who spoke at the meeting, read the salutatory letter of the Presidium of the USSR Academy of Sciences to the collective of the Tsentrakademstroy, having stressed that at present the Tsentrakademstroy is constructing the most important facilities for the conducting of research in the priority directions of scientific and technical progress: space and nuclear research, biotechnology, genetic engineering, computer technology and information science, and scientific instrument making. The contribution of the Tsentrakademstroy to the development of the social sphere of the Academy of Sciences is increasing.

The Presidium of the USSR Academy of Sciences noted with satisfaction the improvement of the production operations of the Tsentrakademstroy. In its organizational structure there are large reserves for the increase

of the technical level of construction—its industrial nature, the shortening of the time of the construction of facilities and structures, and the introduction of new advanced technical solutions, designs, and materials. To put these reserves to use promptly means to ensure the pace of scientific and technical progress, which was set by the party and government.

In the greeting to the Tsentrakademstroy, which was sent by the Moscow City Soviet, the significant contribution of the Tsentrakademstroy to the comprehensive development of Moscow was noted: a number of large structures, which adorn the southwest part of the capital and other regions of the city, were built by it, the development of the network of preschool institutions, health care, the construction industry, and consumer service is being carried out actively.

Greetings from Academicians V.A. Kotelnikov, I.A. Glebov, Zh.I. Alferov, N.G. Basov, A.M. Obukhov, M.M. Shults, and A.N. Tavkhelidze; Yu.P. Platonov, first secretary of the USSR Union of Architects; V.Ya. Karelin, rector of the Moscow Institute of Construction Engineering imeni V.V. Kuybyshev; Yu.D. Zheleznov, rector of the Moscow Institute of Steel and Alloys; and construction organizations of Troitsk, Pushchino, and Tarusa were received by the collective of the Tsentrakademstroy.

On the occasion of the memorable date the Nauka Publishing House published a prospectus, which tells about the history and the people of the collective of many thousands of the Tsentrakademstroy—the basic general contracting organization of the USSR Academy of Sciences.

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Science Parks as Form of Science-Production Integration

18140150a Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 12, Dec 87 pp 105-111

[Article by A.S. Karatayev under the rubric "Through the Pages of Books and Journals": "A New Form of the Contact of Science With Industry"]

[Text] In recent decades in developed capitalist countries a new form of the territorial unification of scientific research with production has spread: "clusters" of modern science-intensive firms have begun to be grouped around a large university or research center. Such a symbiosis of scientific institutions and industry has received the name "science parks." Extensive literature is devoted to them, while in 1985 they became even the topic of discussion of a special international conference.

The science park is a quite large territory, on which science-intensive firms of various sizes and stages of development are located and it is possible to develop if only small-scale works on the basis of scientific and technical developments of the local research center (university). Incidentally, such parks, at which there is not even a pilot works and scientific and technical innovations are brought up only to the stage of a prototype, are also encountered.

The first science parks emerged in the United States in the 1950's. At that time a science park, which later acquired fame under the name Silicon Valley, emerged in the region of San Francisco, while at the opposite end of the continent, in the region of Boston, a science park, which is now called Highway 128, was formed. One should also group with the "old" ones the Cambridge Science Park in Great Britain. These old science parks not only played a large role in the development of the latest equipment (especially computers and aerospace equipment), but also served as an example for the development of the network of science parks both in the United States and throughout the world. Today they also remain classic. In the region of Highway 128 more than 700 industrial enterprises for the production of computer equipment are in operation. Its structures here occupy more than 2 million square meters of territory, of which approximately two-thirds are the buildings of scientific research and experimental design institutions, and its areas are constantly increasing. In 1984 more than $2 billion were allocated for the development of the institutions, which are located at the park, and the purchase of scientific equipment.[1]

In one of the surveys it is asserted that in 1980 in the FRG, France, Belgium, the Netherlands, and Great Britain there were only 10 science parks, while by the end of 1985 already 60 were in operation and more than 50 had been set up or designed.[2] J. Allesch, a staff member of the Technical University of West Berlin, indicates in the FRG by 1985 there were 17 parks and the establishment of about 50 others had been planned.[3] In France about 20 plans of the establishment of new technopolises are being discussed.[4] However, the estimates often differ even for the same countries. For example, the author of the already mentioned survey "Science Parks in Britain" indicates that by 1985, 20 science parks were operating or were being formed in the country,[5] while in another work[6] it is asserted that by early 1985 in Britain 12 parks, which are based on universities, were operating and it was planned to established another 15. For the present in the literature there is no sufficiently accurate estimate of the economic efficiency of science parks, and, besides, such an estimate is hardly possible. At the same time a number of indirect data testify to their great efficiency. For example, it is noted that science parks for their most part have become centers of the rapid development of the latest technologies (computer and aerospace equipment, biomedical developments, and so forth). An unquestionable trait of the success of the new forms of the organization

of research and development is the great interest, which the regional and national administration is displaying in the development of science parks. Frequently science parks change the entire economic structure of the region, in which 10-15 years after their establishment a genuine production boom is observed. Not by chance, when the Texas Science Park was established, did 56 other cities of 27 states compete with Austin. In Texas itself 300 political figures and businessmen together with private firms and the university established a multimillion dollar fund. During the 1st year the activity of the new center gave rise in Austin to a genuine "brain boom": in 1983, 14 science-intensive firms with a staff of 6,100 associates moved entirely or partially to the city.[7] But it is a question here not only of regional shifts of production and local politics. The science parks are changing radically the conditions of engineering and scientific labor. The proximity of the university indicates the opportunity to use the universit·· library and the university computer center and to ta' as production requires courses for retraining or the increase of skills. The possibility of highly skilled consultations on any arising question is also very valuable. On the other hand, the universities acquire access to the latest production base and expensive laboratory equipment, their staff members are enriched by practical experience and by the experience of posing and solving specific problems. The established system of work through the combining of jobs, the doing of practical work by students at firms of the scientific park, and the selection from them of future workers of the firms is also fruitful.

The close contacts between the university and industry are making it possible to shorten drastically the cycle of the development of new technologies or products, especially at the stage of their transfer from laboratories to industry, that is, at the stage of introduction. As a result around universities, which generate new ideas and new knowledge, not only are operating industrial firms being grouped, but new ones, which are oriented toward the most advanced technologies, are being established. Among the basic characteristics of these firms, which are noted by researchers, are the high education of the personnel, who consist to a significant extent of scientist and engineers, the rapid change of technological innovations, a high level of expenditures on research and development—up to 10 percent of the sales volume, and an orientation toward the international product sales market.[8] The firms being established are usually small in size, especially at first, but this does not worry their founders. Several firms, which 20 years ago existed only as small workshops of the "garage type," in the early 1980's already appeared on the list of the 500 largest U.S. firms,[9] while many companies, which today dominate in the economy of the regions of San Francisco and Boston, back 10-15 years ago did not exist at all. According to the data of a study of the Massachusetts Institute of Technology, from 1969 to 1976 two-thirds of the new workplaces in the United States originated as a result of the establishment of new small firms with not more than 20 workers. However, it is usually difficult for small companies, which are being newly established, to find starting capital for investment in new ventures. For the start-up of a new "business" small companies require for the first 3 years of their activity about 300 square meters of space—by the end of this period the company either achieves success or fails. Moreover, at the initial stage it is important to free the company from bureaucratic obstacles.

To give support to the small business, which is oriented toward the latest technologies, the universities offer every businessman, who desires, office premises, scientific consultations, and the opportunity to use workshops, libraries, and instruments at a preferential price. This assistance decreases substantially the initial expenditures of new companies and the degree of their risk. Bureaus, which assume a large portion of the bureaucratic procedures and are connected with contacts with government subdivisions, with the obtaining of licenses, and others, are also established.

Administrators note that it is necessary to strictly see to it that the formed small companies after the completion of the incubation period would leave the grounds of the universities, freeing space for new candidates. Of course, the project, around which the firm is established, should be connected with the research being conducted at the university. The formation of science parks can speed up or slow down depending under what conditions it takes place. Therefore, often the history of the development and success of the classical science parks—Silicon Valley and Highway 128—constantly attracts the attention of researchers. Although they are approximately 5,000 kilometers from each other, as R. Cox, chairman of the Businessman's Forum attached to the Massachusetts Institute of Technology, notes, they are in their essence very similar. At both parks there are all four basic factors which, in the words of Cox, are important for the attraction or development of science-intensive industry: attractive living conditions; the availability of a major technical university; the availability of major scientific research centers; and the availability of skilled manpower.

"Science parks develop successfully in regions where scientists want to live," he noted in connection with the first requirement. And, indeed, the living conditions both in Boston and in San Francisco are very favorable: a moderate climate, beautiful landscapes, an entire set of cultural institutions, good living conditions, and a large number of first-class educational institutions. The science parks in Texas, Florida, Arizona, North Carolina, and others have similar natural climatic and infrastructural merits. At the same time in Knoxville (Tennessee) and in a number of other places the living conditions are not so favorable, and this had a decisive effect on the development of science parks in these regions. Despite the fact that both the University of Tennessee and the large Oak Ridge National Laboratory are located in Knoxville, at this scientific and educational center during the 40 years of its existence it has not been possible

to establish the latest high technology industry. In the opinion of R. Cox, this is connected with the isolation of Knoxville and its lack of appeal for living.

K. Jarboe, an associate of the University of Maryland (the United States), attempted to identify the factors that influence the choice of the site of new small science-intensive firms. The survey was conducted in the region of Ann Arbor, Michigan, where one of the new promising industrial centers is being formed. It turned out that two considerations were basic when selecting the site of a firm: the proximity and accessibility of large universities and a high overall "quality of life" in the region.[10] It is not by chance that in the French technopolis of Sophia-Antipolis, which was established on the famous Azure Coast, half of the total area has been allotted for a green zone, it is prohibited to construct enterprises that pollute the environment, and strict rules, which regulate the area and height of new construction projects, are in effect.[11]

It is necessary to convince the promising scientists, who have been invited to work at the science park being established, that they will feel at home here. It is very important to ensure in good time the establishment of the entire set of enterprises of the infrastructure. If the development of the infrastructure is delayed, this can scare off the most valuable scientists and disrupt the contemplated organization of laboratories. R. Cox in this connection specially singled out as an independent phase the first phase of the formation of the park—the development of the infrastructure (the construction of hotels, service enterprises and stores, restaurants, banks) and the development after the leader (the first large organization that based itself at the park) of small companies. The second (entrepreneurial) phase usually begins only a few years after the first.

The proximity of a large technical university with a great reputation is also no less important. Silicon Valley was formed around Stanford University, the science park of Highway 128 was formed around the Massachusetts Institute of Technology, while the largest science park in Great Britain was formed around world famous Cambridge University. Precisely the university first of all "attracts" scientific research laboratories to the region. For example, the NASA electronics laboratory was based in Cambridge (the United States) only in order to be near the Massachusetts Institute of Technology. The close contacts of the university and research laboratories prove to be mutually advantageous. The university offers special courses for the increase of skills, its staff members participate in joint scientific research projects. The staff members of laboratories, without leaving their job, can receive university titles. In turn, specialists from the university obtain access to at times unique equipment which is available at the laboratories. The great prestige of Cambridge University played a central role in the organization of the Cambridge Science Park in Great Britain. The specialization of the park as if repeated the structure of research at the university (and followed its change): in the 1950's development in electronic optics was conducted at the university, and the firms specialized in the output of the corresponding products, during the 1960's and 1970's both the university and the firms switched to computer technology. Owing to the traditions of the university and the presence of a large number of highly skilled specialists in Cambridge an atmosphere, which was favorable for interdisciplinary contacts between staff members of the university and engineers and managers of the firms, was established. These contacts are being strengthened owing to the fact that the university does not prohibit its staff members from participating in operations "on the side." At present about 400 firms, which are engaged mainly in the output of small small-tonnage expensive science-intensive products, are operating at the Cambridge Science Park and around it. The typical firm here is small (less than 30 people), independent, and young (more than half originated during 1975-1984).[12]

The existence at the park (or near it) of one or several large scientific research organizations (industrial laboratories) also has a favorable effect on the development of the park. First, such organizations assume the role of the leader, by leading the others. Second, only laboratories, which are large and have won prestige, are capable of developing new territory and of developing or attracting the necessary service structures. Moreover, precisely in large laboratories integrated groups of specialists, which at the appropriate moment "break away" from it in order to begin a new promising business, mature most easily. There the future businessman can obtain the necessary scientific and technical experience and enter into contacts. A good example is the radiation laboratory of the Massachusetts Institute of Technology, at which radar was developed during World War II. At this laboratory, the staff of which at the end of the war numbered 5,000, 280 new firms "matured."[13]

The first science parks in the United States emerged for the most part spontaneously. However, soon the governments of practically all countries began to take some steps or others for their encouragement. In the United States always, and especially in the 1980's, the basic attention was devoted to indirect methods of stimulation, that is, to the creation of such general economic conditions, which would stimulate investments of private capital in research and development, the establishment of new science-intensive firms, and the strengthening of the contacts of business with the academic system. The present Republican administration of the United States has taken for this a number of legislative steps, in particular, it changed the tax legislation and repealed a number of provisions of the antitrust laws as applied to cooperation in the area of research and development.

Moreover, methods of the direct state financing of individual inventors and small firms, which suggest interesting innovations, are being used (these steps also have only an indirect stimulating effect on the establishment of science parks, by forming a general climate that

is conducive to innovations). For example, for the stimulation of innovative activity the U.S. Government in 1983 established subsidies in the amount of up to $50,000 for individuals or companies with up to 500 employees, which undertake in 6 months to study comprehensively the possibilities of implementing some new scientific idea. If the study has confirmed the possibilities to implement the idea and private capital has displayed an interest in its further elaboration, the obtaining of the next subsidy already in the amount of up to $500,000 for the next 2 years is possible. This program of assistance to small business in the area of the latest technologies should stimulate scientific and technical progress in the country and should bring up to the commercial stage the results of the research which is being conducted at national scientific laboratories of the United States. In 1985 more than 9,000 proposals, of which 785 received subsidies in the amount of up to $50,000, were submitted for the competition. It is anticipated that from a third to half of them in the future will receive the next subsidies in the amount of $500,000. In 6 years it is proposed to allocate about $1.5 billion for these purposes.[14]

In the European countries central and local organs of government resort more often to the direct financial stimulation of science parks. This difference is explained by two factors: by the traditionally greater role of the state in socioeconomic development (especially in France) and by the relative (as compared with the United States) weakness of industry and the disinclination for new risky undertakings. Both European and American researchers often mention the second factor, speaking about the absence in Europe of "a climate for innovations" and "an entrepreneurial spirit."

In Great Britain, for example, according to the data of J. Currie, by early 1985, 14 science parks were operating, 7 more were being formed, and 8 were being planned. During 1982-1985, 36.5 million pounds sterling were spend on the designing and construction of new science parks, of them 55 percent were allocated by the government, 11 percent were allocated by universities, while the remaining assets were received from private industry.[15] In France the spending on the establishment of the technopolis of Sophia-Antipolis came to approximately 600 million francs, here the central government and the authorities of Alpes-Maritimes Department made about 200 million francs available.[16]

But the government policy of stimulating the development of science parks is being pursued most consistently not in the United States and even not in Europe, but in those countries which are striving to catch up with (or, like Japan, to overtake) the traditional developed capitalist countries, especially in the sphere of the latest technologies. For example, in the countries of the Far East science parks began to emerge in the 1970's and 1980's. Now several science parks are operating or are being organized in Japan (including the "science city" of Tsutsuba, where the Expo-85 world exhibition was held) and one each is operating or being formed in Singapore, South Korea, Taiwan, and Thailand. They are already now making an appreciable contribution to the economic development of the region. Despite the differences (first of all, the incomparably greater economic potential of Japan), there is one common trait in the development of the science parks in these countries: they are all the fruit of creative government policy. The spontaneous grouping of scientific, technical, and industrial organizations around a large university, as in the United States, is not occurring in any of these countries.

In Japan the entire policy of regional development and industrialization is based on the plan of the development of a network made up to 19 technopolises—new cities where the close integration of industry and science is ensured territorially and structurally—which is being implemented under the aegis of the Ministry of International Trade and Industry. This plan, which was announced in 1981, acquired the force of law in 1983 and should be completed in 1990. It is a part of the fourth five-year plan of national development (1986-1991). The plan takes into account two characteristic factors for modern Japan: the increasing reluctance of young specialists to leave their native areas and the specific nature of the products of a number of modern science-intensive sectors of industry—the small size and weight of the final items and the ease of their transportation.

The state gives assistance only at the initial stage of the establishment of the technopolis, acting mainly through regional organizations of the stimulation of industrial and technical development and through government departments, which finance the program of the regional development of the leading sectors of industry and subsidize research and development at small firms. Moreover, the government grants the private firms, which are participating in the establishment of technopolises, tax breaks and special loans at low interest. But in principle the carrying over of the model of science parks to other countries does not always prove to be successful. For example, in the FRG the extensive establishment of science parks began in 1983. However, as specialists note, the direct carrying over of the experience, which was gained in the United States, to FRG soil proved to be impossible. As applied to the economic and administrative peculiarities of the country its own models of the development of parks began to be elaborated. The majority of centers begin with a simple idea: an existing building is renovated and is distributed among 10-30 small firms. Halls for the central staff and the secretariat, which serve all the newly fledged entrepreneurs, are allocated. The fee for the premises either is not collected at all for some time or is reduced substantially. Proximity to a university is an important part of the plans of new entrepreneurs. Unfortunately, West German specialist J. Allesch notes, the FRG is experiencing a shortage of young businessmen with good ideas, which is slowing appreciably the development of science parks. In particular, the fact that of the 700 million marks of

venture capital, which were available in 1984, only 100 million marks were used, testifies to this. In the opinion of Allesch, science parks are important not only as a stimulus of regional economic development, but also as a good medicine against the disease of stagnation in the economy of Europe, which has acquired the name "Eurosclerosis." However, Allesch admits, the roots of this disease are more sociocultural than economic, and for its overcoming it is necessary to change the attitude of the European public and scientists toward entrepreneurship in general and particularly toward the establishment of new science-intensive venture firms.

In the opinion of many authors, precisely the creation of a psychological atmosphere, which stimulates attempts at the establishment of new firms, regardless of the high risk connected with this, is also a significant result of the development of science parks. It is necessary to bear in mind that the innovative people, who make such attempts, are often staking their own well-being, reject a traditional career, and so forth. In American society the status of a businessman is very high, but the businessman has also been trained to bear failures stoically, a tolerant attitude toward failure is widespread. At one time Europeans were also noted for this, but, in the opinion of D. Birch, a professor of the Massachusetts Institute of Technology, they have lost these qualities.[17] In the United States special societies exist, journals are published, and conferences, the goal of which is to help young businessmen to organize new firms, are organized. This atmosphere, in turn, stimulates the establishment of science parks.

The study of the experience of "science parks"—both positive and negative—may prove, in our opinion, to be rather fruitful for our country.

Footnotes

1. "Science Parks and Innovation Centres: Their Economic and Social Impact: Proceedings of the Conference Held in Berlin, 13-15 February 1985," Commission of European Communities, edited by J.M. Gibb, Amsterdam, etc., Elsevier, 1985, p 18.

2. J. Currie, "Science Parks in Britain: Theor Role for the Late 1980's," Trinity Hall, CSP econ. Publ., 1985.

3. "Science Parks and Innovation Centres," pp 59, 65-67.

4. J. Currie, op. cit., p 28.

5. "Science Parks and Innovation Centres," p 33.

6. E.M. Rogers, "The Role of the Research University in the Spinoff High-Technology Companies," TECHNOVATION (Amsterdam), Vol 4, No 3, 1986, pp 169-181.

7. Ibid., p 173.

8. Ibid., p 172.

9. "Science Parks and Innovation Centres," pp 20-21.

10. K.P. Jarboe, "Location Decisions of High-Technology Firms: A Case Study," TECHNOVATION (Amsterdam), Vol 4, No 2, 1986, pp 127-128.

11. "Science Parks and Innovation Centres," pp 87-88.

12. N.S. Segal, "Universities and Technological Entrepreneurship in Britain: Some Implications of the Cambridge Phenomenon," TECHNOVATION (Amsterdam), Vol 4, No 3, 1986, pp 190-191.

13. "Science Parks and Innovation Centres," p 10.

14. Ibid., p 23.

15. J. Currie, op. cit, pp 3-4.

16. "Science Parks and Innovation Centres," p 89.

17. Ibid., p 22.

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New Institutes of USSR Academy of Sciences

18140139 Moscow KHIMIYA I ZHIZN in Russian No 9, Sep 87 p 26

[Article under the rubric "Information": "In the USSR Academy of Sciences"]

[Text] The Institute of Structural Macrokinetics of the USSR Academy of Sciences has been established in the settlement of Chernogolovka of Moscow Oblast on the basis of the Department of Macrokinetics and Gas Dynamics of the Institute of Physical Chemistry of the USSR Academy of Sciences. Doctor of Physical Mathematical Sciences A.G. Merzhanov was approved as director of the institute.

The Institute of Water and Ecological Problems of the Siberian Department of the USSR Academy of Sciences has been formed in Barnaul. Among the basic directions of the work of the institute are: the scientific substantiation of water management, reclamation, and nature conservation measures on the territory of Siberia; the development of methods of the study of the natural processes, which occur in bodies of water and other natural systems, and the comprehensive evaluation of the ecological consequences of changes of the hydrological regime; the study of general questions of the efficient use of nature and

environmental protection, as well as the socioeconomic problems of the development of Altay Kray. Corresponding Member of the USSR Academy of Sciences O.F. Vasilyev was appointed director of the institute.

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Better Secondary Teachers Needed

18140173 NTR: PROBLEMY I RESHENIYA in Russian No 24 22-31 Dec 87 pp 4-5

[Article by Z. Gelman, teacher, School No. 905, Moscow, candidate of chemistry: "The 'Shop' Where Generations are Formed"]

[Text] **"After bread the most important thing to a people is school." These are the words of J. Dalton. He wrote that if it remains outside society's attention, school ceases to be a "shop" where the generations are formed. In other words, it perishes.**

Today much is being said about school. However, so far it has had no noticeable effect. The words are cast to the winds. Hands have not yet done deeds. Why? I think it is because so far we still have not directly cast light upon the teachers.

For a long time schools have urgently needed a new type of teacher — a teacher-research and a teacher-intellectual. If they had appeared yesterday, or the day before yesterday then we would have less of what we now call stagnation. However, if such teachers do not enter the classes soon there will be doubt about the very possibility of improving our country's intellectual power. I am not revealing any secret when I say that such power is determined and formed by teachers.

WHAT AND HOW TO TEACH

To pupils a teacher should be not so much a source of knowledge as an individual to help them understand the development of society, to understand the linkages in various areas of science, culture and civilization in general. It is my deep conviction that strict departmentalization of fields fragments the world to pupils. To view it from the aspects of physics, biology, literature and geography hinders the formation of its integral features in pupils' minds.

Vasiliy Porfirevich Vakhterov, a prominent Russian pedagogue at the end of the 19th and beginning of the 20th century wrote: "When teachers explain a discovery, downplaying how people made this discovery, they only cultivate passivity and gullibility. " I am in agreement with his thoughts that "unhistorical" or "extrahistorical" teaching leads to "mental parasitism."

In my view there are two ways to bridge this gap. I have already written about one — setting up school courses in the history of science and culture. At that time I noted that their inclusion into school disciplines would give pupils a general view of the development of civilization as a whole. However, in reality our schools do not give many chances to those fighting for such courses. First of all, the question as to who would teach such a course immediately arises. This is far from rhetorical. Neither pedagogical VUZes nor universities are preparing such specialists. One must also not discount difficulties of a psychological character. Even without a dense schedule of school disciplines, school workers, teachers and initially and the pupils themselves would hardly be enthusiastic about a new subject.

Therefore, I propose that another path may be viable, specifically, saturate the "humanities component" with the hours devoted to the mathematics-natural science cycle in the present school program. I stress "present", for in the published draft to the new program, the time devoted to almost all humanities has been sharply curtailed.

Here is the idea behind the new program: through the hours saved in cutting courses in mathematics, physics, chemistry and other subjects, increase the time studying history, geography, literature, etc. Alas! We have again fallen into extremes.

It is well known that a characteristic of great scientists such as C. Darwin, V. I. Vernadskiy, K. E. Tsiolkovskiy, N.I. Vavilov and Einstein was the interaction between natural sciences and humanities. On the other hand the breadth of knowledge in humanities depends greatly upon the heights of talent.

Shakespeare and Cervantes had an excellent knowledge not only about the kitchens of alchemy, but also about practical chemistry and medicine. Goethe's works in physics, biology and chemistry have won him fame equal to his poetic works. According to his son, Aleksandr Radishchev considered chemistry his second profession. Vladimir Khlebnikov's and Vladimir Nabokov's extensive knowledge of natural sciences is well known. One can find a lot of material from various fields of science in the works of Pushkin, Dumas pere, Balzac, Tolskiy, Hugo, Dickens and Bulgakov. Among contemporary writers, in my opinion the natural science component plays an important role in the books of Danil Granin, Veniamina Kaverina, Iris Murdoch and John Updike.

I am convinced that a serious study of the natural science component in such "poetic" works still awaits its researchers.

As far as school education is concerned, it seems to me that it is necessary to fuse the humanities, mathematics, natural science and polytechnic studies into a single complex. Then, in the words of heroes of Victor Hugo in "The 93rd Year", having combined Homer and Euclid into a single personality we obtain a harmony between dreams and rigorous thinking.

In my view, if there were a law on school education, one of its first prerequisites should be the prevalence of humanities over technocratic education. Why? Because school education is first of all upbringing in principles which cannot be formed and strengthened without well developed thinking in the humanities. After all, even a study of the natural sciences (which, strictly speaking are not technocratic) without precise moral guidelines can

lead young people to an anti-science attitude. Pupils must be introduced to important dialectical principles — the capability of always reexamining the concepts of truth and falsehood.

It is necessary to bring the humanities to natural sciences, mathematics and the polytechnic disciplines, but not to geography and literature. To do this (if integrative courses are not introduced) requires increasing the humanities component of school courses in all subjects. Chemistry, physics and biology can, to a considerable degree, be examined from the perspective of the philosophy, ethics, history and logic of development in science. We must introduce the human factor, i.e., the "drama of people" and the "drama of ideas", which are now far from the core of studies.

WHOM IS THE SCHOOL WAITING FOR.

To make no progress and not be able to improve one's intellectual level is a bitter thing for people. For a teacher it is a tragedy. For a long time society did notice this tragedy and was indifferent about its direct results (stereotypical thinking, boring formalized lessons, etc). One of the school reform's main goals was to improve the professional and spiritual potentials of teachers. Unfortunately, it must be admitted that so far this has not happened. The reform obviously is stalled here. The reasons are clear — the announced direction found no real support. We are talking about a new type of teacher, a teacher-researcher and intellectual, a teacher capable of independently thinking and finding solutions. There are no such teachers yet and probably will not be until conditions have been created which promote their development.

Everything becomes clear through comparisons. Therefore I will give an example. Recently I read a book about the Dutch physicist van der Waals. I was impressed by the wave of scientific thought in Holland at the end of the 19th and beginning of the 20th Century. In the first 15 years Nobel Prizes were awarded 4 of the winners were Dutch. Was this accidental? I assert that it was a result of the reforms in secondary education which took place in that country during 1862-1863. It is easy to see that its results would appear at the end of the 19th and beginning of the 20th Century.

One of this reform's goals was to attract teachers inclined towards science. Secondary schools began to announce competitions to attract scientific workers as teachers. With regard to the potentials to do scientific work, secondary teachers were in a better position than university teachers. This is why the future Nobel laureates van der Waals and J. Van't Hoof were, for many years, teachers in Holland's schools.

In Russia many gifted scientists, writers and cultural figures did this kind of teaching. The example of K. E. Tsiolkovskiy is known to any cultured person. Less known is that after finishing his first VUZ the gifted Russian and Soviet physiologist Aleskey Alekseyvich Ukhtomskiy became a teacher in Volokolamskiy Uyezd.

After completing work at Moscow University, the noted Russian scientist Sergey Nikolayevich Nikitin was for a long time a geography and natural history teacher at several Moscow gymnasia. Interestingly, he ceased teaching after he was award a master's degree in geology and paleontology. During these years he wrote a text on geography and botany for gymnasia, which came out in several editions and enjoyed great success. In Russia there several texts written by teachers at gymnasia and academies. These were published not only in capital cities, but also in the provinces. This continued until the 30's.

What do we see today? A strange picture. Recently in *Sovetskaya Rossia* I pointed out that texts written by teachers sit on publishing house shelves for 10 years and more and also that I had received a phone call from one V. K. Sovaylenko, a school teacher in Novocherkassk, who reported something startling. It turns out his math text has been awaiting publication for almost 40 years. It was not denied publication because it was bad, but because responsible comrades said they did not have time to look at it.

Incidentally, even if one is wise as Solomon, it is not easy for a teacher to write a good book. They absolutely refused to let this teacher become a reader at the country's largest library at the USSR Academy of Sciences' Institute for Scientific Information in the Social Sciences (INNON) and at the USSR Academy of Sciences' Natural Sciences Library. They asked about his motives and said that first he had to become an associate at the Academy and later a reader. The stacks in the Science Library imeni A. M. Gorky at Moscow State University are only open to graduates of this university.

There is no need to talk about books' "breaking through" to editorial offices and corridors. A junior scientific associate at any NII brings in more of them than the most talented teacher. Isn't this why that remarkable tribe of teacher-enlighteners is dying out?

ON THE THEORETICIANS OF PEDAGOGICS

Two or three years ago at a teachers conference I heard a speech by a quite well known scientist who modestly called himself a "theoretician of pedagogics." I recall that somehow the audience did not respond to his proposals. The speaker became excited, started fervently arguing his point and in conclusion recommended that teachers (not all, but "some") keep in mind Montaigne's thoughts: "If you want to treat yourself for ignorance, you must acknowledge it." It was a transparent hint: comrades, read more pedagogical and other books, develop, do not stand still.

Are there really books for teachers by "theoreticians of pedagogics." Take, for example, one entitled *Soderzhaniye obshchego srednego obrazovaniya. Problemy struktury" [Content of General Education. Problems of Structure]. The author is Vadim Semenovich Lednev, a noted scholar, and doctor of pedagogical sciences. The publishing house "Pedagogika" is also for teachers. Lets not open the book at random, but turn to the section which must be the most applicable to teaching "Relationships Between Subjects" and to the chapter on teaching, "General Characteristics of Subjects and their Relationships." What do we read? I quote: "The aspectua' discipline and the related objective discipline are autonomous in the sense of their study and to the extent that they are specific and independent of general law governed patterns of law governed patterns reflecting objective science. On the other hand, objective and aspectual disciplines are determined to the extent which there are law governed patterns in each, the aspectual science studied characterizes the level of material organization in the objective science studied."*

Did you understand anything? I didn't. I assure you there are no errors in this quotation. I forced myself to read the entire book (264 pages) and did not understand anything. Seriously doubting my mental capabilities, I asked five of my colleagues to read it (not saying anything bad about the book). Only one read it entirely. The results were similar to mine. To whom do you think this book is addressed: to "workers in the area of pedagogics." Does this mean teachers? Nothing of the sort. It is for those who write such books, but do not work in school.

However, this is not all. Scientistic pedagogical literature is supplemented by the wildest utilitarianism of some pedagogical ideas, fully recognizable as dissertation material. Take the abstracts of two dissertations, the defense of which was planned at the UkSSR Scientific Research Institute for Pedagogics and the MGPI [Moscow State Pedagogics Institute imeni V. I. Lenin]. I read the title of the first one "Relationship of Curricular and Extracurricular Reading as a Means of Creating the Instructional Independence of Young Pupils."

I want to be correctly understood. I am not against posing the question (even the problem) in this title, however, I doubt if this is a theme for a research dissertation. The dissertation's conclusions are "earth shaking." One of them states "...assure integrity and continuity in the functioning of the substantiative, procedural and motivational types of relationships between reading in and out of class and during work hours with groups after work and in independent work outside of school." No less "new" and "significant" is, for example, a recommendation such as "providing for the planned publication of text-methodological literature for teachers, educators and parents..."

The title of the other dissertation is "Teaching Young People to Read Folk Tales and Literature."

It is very good that Pushkin's Arina Rodionovna and other nannies didn't hear a thing about such "dissertations." If one reduces pedagogical science to primitivism what can one expect from present day and future teachers? They will think of themselves as work horses, ordered about in a language they don't understand.

Something is needed and they say they want to help in some way, but if fact create something uncomprehensible and unsuitable. I still keep a letter from the editor of a pedagogical publishing house, who, in answer to my request for a text on the history of organic chemistry, wrote, "...the views of Emil Fisher on proteins and carbohydrates should not be examined as they have long become obsolete." To chemists this answer sounds almost like, "The periodic table has become obsolete."

What is happening in pedagogical science? There are no precise ideas about strategic or tactical paths in its development. Thousands of people are working in the Academy of Pedagogical Sciences and the ministries of education. However, for several years (decades!) they have not been able to work out even the concepts of education to serve as the framework for for mainline scientific developments. Why is this? Are these subjective oversights or a failure in all aspects of the society's aims?

Only creative research activity can form the new type of teacher about whom we have talked so much and whom the schools badly need.

What does this require? First, status accurately reflecting the teaching profession's creative potentials. For example, giving incentives to publish the works of practicing teachers, having congresses and conferences for teachers which are not only of a general character, but are specialized, for mathematicians, philologists, chemists.

The past is interesting. In skimming through several pedagogical journals from the beginning of this century (incidentally, there were considerably more at that time then now), my attention was drawn by the numerous ads for teachers' educational tours abroad organized by the Educational Department of the Society for the Dissemination of Technical Knowledge in Moscow. Thanks to these trips teachers with quite modest salaries were able to become acquainted with foreign achievements in pedagogics.

WHO IS TO TEST THE PUPIL

Personally, to me it is an anachronism to separate "enlightenment-educational" agencies into higher, secondary and professional-technical. Most teachers and VUZ instructors I know think that a reform of all stages in education should be worked out and introduced simultaneously.

How can one talk of any continuity in education today when at VUZes the educational process in practically all disciplines begins almost from scratch? This is departmental fragmentation and lack of faith in schools.

It would be very good if in their later classes VUZes were more "mixed up" in school affairs. During the time of Pushkin and Griboyedov, instructors at universities (Petersburg, Moscow) did not shun teaching in secondary educational institutions. Senior classes students at gymnasia and pupils in senior departments at boarding schools had the right to attend university lectures. So-called "gymnasium classes" were set up at universities. There was no greater praise for an instructor than to say that he was equally well understood by students and pupils. Who taught Griboyedov at the Moscow Boarding School? University instructors. Isn't this why at age 11 he became a student at Moscow University?

Who taught A. S. Makarenko's children in the Working Childrens' Commune imeni F. E. Dzerzhinskiy? A professor from Kharkov University! Without any pretence, the world of a capital (Kharkov was capital of the Ukraine at that time) came to the former waifs and delinquents. This is democracy! It is not surprising that when Theodore Dreiser visited our country in those years he wrote: "There is one aspect of contemporary Russian life which I approve wholeheartedly — Its educational system..."

DON'T WASTE TALENT

For a long time we essentially avoided questions of children's differing giftedness. The shameful term "extend the program" came into use. Discussions usually did not even turn to good, or extra good pupils. Teachers were little concerned with them. That, in disregard of their very nature, these pupils were squeezed into a Procrustean bed of mediocrity seemed to be trivial and not worthy of special attention.

What did we do and continue to do? American universities send their emissaries all over the world to buy up "brains", but we do not gather up or cherish talent. We have still not learned how to cultivate it. What kind of "cleaver head" thought up teaching everybody the same way, with the same programs and texts? Are not these ideas of "equivalence" echos of that distant pyrrhic victory of the Lysenkoists over the geneticists? After all, it must be admitted that giftedness is primarily due to the genes for this special capability, what the people have long called "the grace of god."

The information boom in our time has not only touched upon production, economics and science, but is also changing pupils' usual circle of interests. Recently an eighth grade pupil came to me with a question. This was a well informed, intelligent young man. I must admit that his question was not so much troubling as it was discouraging. Judge for yourself, he asked me: "Could love be similar to thermal radiation?" It is, one might say, too specialized a question. However, for my part, I could not but be interested in such a crafty question. Why did this occur to him? Questions about love can arise at any age, but from such an angle?

It turned out that my eighth grader was reading the reference journal *Social Sciences Abroad*, in Issue No. 1 of this journal I found an abstract of an article by the American professor Janet Levin the title of which had been accurately repeated in my pupil's question.

While still in school, many talented, working age boys and girls become acquainted not only with popular scientific, but scientific and academic literature. I am therefore convinced that pupils should never have been taught in the same way. This is all the more true today.

What steps can be taken? First of all, authorize teachers to instruct children with an eye to their capabilities, potentials and intentions. To do this teachers (and pupils) should have several alternative texts which a teacher could recommend to various groups of students. Secondly, a teacher should, at least in the senior classes, be freed from the obligation to teach what nobody wants to learn. Compulsory teaching is senseless. Perhaps it can be a right which is exercised if desired!

A natural sciences teacher should not forget about "the queen of the sciences" — mathematics. The giftedness of a pupil in any area of science is best determined by success in mathematics. To me this is a person combining extraordinary skills in mathematics and chemistry. A pupil at my school, Serzha Khalyapin, was just such a person. Last year, only 14 years old, he completed an evening chemistry school at the Moscow Chemical-Technical Institute imeni D. I. Mendeleyev. Overcoming a regulatory barrier he became a student at the Chemical Synthesis Department in the Mendeleyev Institute and was the youngest student in the country in 1986. Now he is an A student in the second class and a prize winner of many student Olympiads. The situation is similar for the "magnificant five" eighth graders this year, who also completed evening school at the Mendeleyev Institute and, skipping a class, went on to become tenth graders. Frankly, it is only the backwardness of administrations at various levels which interfered with capable students taking external students' examinations for the entire secondary school course. The best among this group of five is 13 year old Serezha Sosonyuk. Probably, next year the youngest student in the country will again be a graduate from our School No. 905.

What must be done to develop gifts? Much, but first of all an individual approach to studies. In a mass school system this means the democraticization of the entire educational process. Pupils should have the right (for example in the sixth grade) to select subjects and the possibility to select the main subjects, while retaining four-five required courses.

It is school which lays the foundations for dialectical thinking and a serious attitude towards work. Democratic forms of study and education will remain lessons throughout life.

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UDC 006.062:65:658.562

Quality Control Training for Communications Workers

18140154 Moscow STANDARTY I KACHESTVO in Russian No 12, Dec 87 pp 65-69

[Article by Doctor of Economic Sciences N.M. Gubin, Candidate of Economic Sciences L.I. Mayofis, and R.L. Fuksman, the All-Union Correspondence Electrical Engineering Institute of Communications: "The Restructuring of the Educational Process"]

[Text] It seems that it is not necessary to explain how important the high-quality and smooth operation of means of communications is under the conditions of restructuring, the intensification of social production, and the rapid introduction of the achievements of scientific and technical progress. In the decree of the CPSU Central Committee "On the Work of the Ministry of Communications on the Improvement of the Service of the Population by Telephone and Other Types of Communication" it is stressed "that the more complete and high-quality meeting of the needs of the Soviet people for communications services and the increase of efficiency in this work are of great social importance" [1].

Unfortunately, for the present the level of service of the population by means of communications still lags seriously behind present requirements. The analysis of the letters, which were received by the USSR Ministry of Communications in 1986, showed that the number of valid complaints of workers increased during 1986 as compared with the preceding year by 3.5 percent [2].

In our opinion, the introduction in the practice of economic activity of communications enterprises of comprehensive systems of product quality control is contributing in many respects to the improvement of work. Nevertheless, the surveys made in recent times showed that the level of introduction of comprehensive systems of product quality control at communications enterprises of the country as a whole does not exceed 30 percent. Moreover, in individual regions no work is being performed at all in this direction. The low level of introduction of comprehensive systems of product quality control in the communications sector is explained by the lack of skilled specialists. The experience of the chair "The Organization and Planning of the Work of Communications Enterprises" of the All-Union Correspondence Electrical Engineering Institute of Communications (VZEIS), which performs the functions of the main organization of the USSR Ministry of Communications for the development and introduction of comprehensive systems of product quality control and holds consultations with personnel who are dealing with the development and introduction of comprehensive systems of product quality control in the sector, also testifies to this. During the process of consultations and lessons it was revealed that a certain portion of the personnel of communications enterprises do not have adequate training in questions of product quality control.

The organization of a well thought out system of the continuous training of personnel of communications enterprises at all levels of the vocational training of personnel, that is, starting with the vocational and technical school and ending with the corresponding series of lectures at the Institute for the Improvement of the Skills of Management Personnel and Specialists of the USSR Ministry of Communications, could help in eliminating the gaps in knowledge.

The activity of the chair, which is being carried out within the framework of the section "The Scientific Organization of Labor and the Management of Communications Enterprises" of the Central Board of the Scientific and Technical Society of Radio Engineering, Electronics, and Communications imeni A.S. Popov (the members of the chair make up the aktiv of this section), is diverse.

In recent years the section has performed much work on the study and promotion of advanced forms of increasing the production efficiency and product quality of communications. Thus, in 1986 two field meetings of the section were held: in Dnepropetrovsk—"The Increase of the Efficiency of the Work and the Product Quality of Communications" and in Krasnodar—"The Brigade Form of the Organization and Stimulation of Labor at Communications Enterprises." In 1988 it is planned to hold the All-Union Scientific and Technical Conference on Questions of the Increase of the Quality of the Products and Services of Communications. As a rule, such measures bring together a wide range of specialists from all corners of the country. The sharing of experience takes place, means of further increasing the product quality of communications enterprises are outlined.

And, of course, the nucleus of this system is the higher educational institutions of the country, which, as is noted in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Radical Increase of Product Quality," should train specialists, who are ready to work under the new conditions and "to master modern economic thinking and the skills of management, organizing, and educational work" [3].

For the accomplishment of these tasks it is necessary to closely link the curricula of higher educational institutions and the syllabuses of individual disciplines with the problems of the intensive development of the economy. Students should know the conditions and factors of the intensification of the national economy and find their

bearings well in questions of the management of the socialist enterprise, which operates on the principles of full cost accounting, self-support [samookupayemost], and self-financing.

The correspondence and evening forms of instruction at the higher educational institution enable students in practice to apply the knowledge that was obtained in the process of studying the course "Standardization and Product Quality Control." The changeover of instruction to a modern basis can be achieved in several directions. One of them is the revision of the syllabuses of the characteristic disciplines with the inclusion of additional sections, for example, the technical parameters of communications equipment, which have a direct influence on the end result of the work of enterprises—the quality of the communications services being rendered. At our institute such additional sections have already been included in the courses "Metrology, Standardization, and Measurements in Communications Equipment" (for the specialties "Automatic Electrical Communications," "Multichannel Electrical Communications," "Radio Communications and Radio Broadcasting") and "Interchangeability, Standardization, and Technical Measurements" (for the specialty "The Automation and Mechanization of Communications Enterprises").

Another possible direction is the strengthening of the corresponding sections of economic disciplines, such as "The Economics of Communications" and "The Organization, Planning, and Management of Communications Enterprises." The sections "Product Quality Control," "Comprehensive Systems of Product Quality Control of Communications," and so on are being introduced in the indicated courses, which in part also accomplishes the posed tasks.

In our opinion, one should recognize as the most effective method of studying the questions of standardization and product quality control the organization of the continuous training of students in this direction, that is, the introduction of the special course "Standardization and Product Quality Control," which encompasses all aspects of the production activity of communications enterprises.

Such a course was also introduced at the All-Union Correspondence Electrical Engineering Institute of Communications during the 1986/87 school year.

Multistage preliminary work preceded this:

—the choice of the student body;

—the allocation of time for the study of this course;

—the training of instructors;

—the development of the syllabus of the course;

—the preparation of educational methods documentation.

The chair decided to include the course "Standardization and Product Quality Control" in the curricula of the 4th year in the specialty "The Economics and Organization of Communications" (the evening form of instruction).

The choice of the specialty is due to the fact that under the conditions of the radical restructuring of the management of the economy not the engineer, but the economist is gradually becoming the main figure in the entire system of management. (For example, in the United States at the turn of the 1980's only less than 10 percent of the top managers of leading companies were specialists in technology. The majority of economic managers were economists or graduates of business schools.)

Moreover, the analysis made by the chair testifies that a significant amount of work on the development, introduction, and functioning of comprehensive systems of product quality control is performed by workers of the economic subdivisions of production engineering administrations and communications enterprises (planning divisions, laboratories of the scientific organization of labor, and others). Therefore, it was decided that the instruction first of all of economists in the principles of standardization and product quality control would have a positive effect on the speeding up of the solution of the problem of improving the quality of communications and the services being rendered.

For the better mastering of the course being newly introduced the future engineer-economists of communications should have a specific store of knowledge, such as is gained in 3 years of instruction, with the study of base economic disciplines and the principles of communications equipment. Therefore, the 4th year was chosen for the introduction of the new discipline.

In the senior courses it is already necessary to orient students toward the accomplishment of the main task of communications enterprises—the rendering of high-quality communications services. Such a procedure of studying disciplines will also make it possible to increase the quality of graduation designing.

The latest works of sectorial scientific research institutes, the results of the work of leading communications enterprises, as well as publications of members of the chair, which were prepared in accordance with the results of conducted research [4-6], were used extensively in the process of preparing for the conducting of the course.

For the increase of the quality of instruction staff members of the scientific research laboratory, who have sufficient experience of pedagogical work at the higher educational institution, were enlisted in the giving of lectures and the conducting of practical lessons.

In spite of the fact that the plan of educational lessons and the program for the course were developed at the institute back before the publication in the press of "The Model Plan of the Instruction of Personnel in Questions of the Increase of Product Quality" and "The Standard Program for the Course 'The Fundamentals of Standardization and Product Quality Control'," which was developed by the USSR State Committee for Standards [7], the institute plan did not have fundamental differences from the recommended plan, and its adjustment was carried out during the conducting of educational lessons in the course (in the area of the detailing of the examination of the sections that are connected with the specific nature of the product of the communications sector).

During the preparation of the course, as well as in the process of conducting the lessons the basic economic peculiarities of the products of the communications sector were taken into account. (As is known, communications enterprises, in contrast to industrial enterprises, agriculture, and construction, do not create a materialized product. In this case the very process of transmitting messages is the product, while the specific message acts as the object of labor of the workers of communications enterprises.)

Moreover, in the communications sector the processes of the production and consumption of a product are continuous in time. For example, if in case of the breakdown of a communications channel the operation of telegraph and telephone communications is disrupted, at the same time the consumption of the product of communications also ceases, since the transmission of telegrams slows down, while the telephone call is interrupted. Here it must be noted that in contrast to the consumer of industrial goods the consumer of the product of communications does not have the opportunity to replace a low-quality product with a product of a higher quality. A message, which has been transmitted with the distortion of the text or with a great delay, not only loses its use value, but can also cause serious harm, especially in the sphere of national economic consumption.

On the basis of the economic peculiarities of the sector and the recommendations of the USSR State Committee for Standards particular attention was devoted to the study of the following sections of the course:

—the interrelationship of product quality and scientific and technical progress;

—the role of standardization in the acceleration of scientific and technical progress and the increase of the quality of the communications product;

—the Quality Programs at communications enterprises;

—the development and introduction of comprehensive systems of product quality control at communications enterprises;

—the organization at enterprises of quality groups and their role in the increase of product quality;

—the state acceptance of products at industrial enterprises of the country;

—socialist competition and the stimulation of the increase of the quality of communications;

—the determination of the economic efficiency of the increase of the quality of the product of the sector.

The lack of a textbook for the course required increased attention to the preparation of educational methods documentation. At the beginning of the semester the students received a plan of the conducting of lessons in the course, in which along with the themes of lectures and practical lessons the basic, special, and additional literature on each theme was indicated. Since a certain portion of the lessons involved the examination of the principles of the development and introduction of comprehensive systems of product quality control at communications enterprises, each student received "Procedural Recommendations on the Development and Introduction of Comprehensive Systems of Quality Control of the Product of Communications at Communications Enterprises of the Sector 'Communications'," which were formulated by the chair and after approval were sent by the USSR Ministry of Communications to all subordinate enterprises for practical use [8].

In conformity with the curriculum-schedule the study of the course "Standardization and Product Quality Control" concludes with the taking of a theoretical test. During the holding of the test along with theoretical questions the students are required to solve a task, which includes real problems that face economists of communications in the process of the production activity on the improvement of product quality, such as the determination of:

—individual indicators of the quality of the product of communications (the availability factor of equipment, the coefficient of errors, and others);

—the coefficient of the quality of the labor of individual communications workers under the conditions of the operation at the enterprise of the comprehensive system of product quality control;

—the generalized and comprehensive indicators of product quality of communications enterprises;

—the economic effectiveness of the expenditures on the development and introduction of comprehensive systems of product quality control at various communications enterprises.

In our opinion, one of the causes of the decrease of the activity of students when studying individual sections of the course consists in the fact that the students do not

sense "feedback" of the educational process with production. Thus, up to now at the majority of communications enterprises of Moscow and Moscow Oblast, that is, where the bulk of the student body of the evening form of instruction works, proper attention is not being devoted to questions of product quality control. This had the result that the students perceived the sections of the course, which are connected with the study of questions of the development, introduction, and operation of comprehensive systems of product quality control, as purely theoretical sections, since they did not use the acquired knowledge in practical activity.

Apparently, the formed stereotypes of thinking, which it is necessary to overcome during the radical restructuring of the management of the economy, which is taking place in the country, to a certain extent have an effect here.

As of January 1987 the USSR Ministry of Communications introduced a new procedure of evaluating the product quality of the operating enterprises of all subsectors of communications.

Until recently the evaluation of product quality of communications enterprises was carried out by means of the notorious method "from what has been achieved." This did not ensure the obtaining of an objective evaluation of the work of the enterprise on the increase of product quality. One of the drawbacks of such a method was that it was more difficult for enterprises with higher results to increase the achieved level than for enterprises that operate worse. For the purpose of the more correct evaluation of product quality, the increase of material stimuli, and the overcoming of elements of "unwarranted leveling" a point method of the evaluation of quality was introduced in the sector [9].

After familiarization with the sectorial materials on the use of the point method of the evaluation of product quality by communications enterprises this material was included in the corresponding sections of the course, which aroused the interest of students.

Moreover, the activity of students when examining the questions of the material stimulation of the increase of product quality, the brigade form of the organization and stimulation of labor, the organization of quality groups, and others was noted.

For the better mastering by students of the content of the most important sections of the course the plan envisages the conducting of practical lessons. Their themes for the most part are connected with the examination of the most urgent questions of the development, introduction, and operation of comprehensive systems of product quality control at communications enterprises. Thus, practical lessons were conducted on the following themes:

—the procedure of the formulation and drawing up of the technical assignment and detail design of comprehensive systems of product quality control at communications enterprises;

—the content, the drawing up, and the procedure of the formulation of the basic, general, and special standards of the enterprise;

—the methods of calculating the economic efficiency of the development and introduction of a comprehensive system of product quality control at a communications enterprise.

In performing the functions of a main organization, the All-Union Correspondence Electrical Engineering Institute of Communications carries out the evaluation, registration, and recording of the documents (working documents, technical assignments, and detail designs) of the comprehensive systems of product quality control of the ministries of communications of the union republics, oblast (kray) production engineering administrations, as well as individual communications enterprises. These documents were used extensively during the conducting of the practical lessons for the course, which undoubtedly contributed to the increase of the efficiency of the study of the corresponding sections of the course.

The first experience of teaching the course "Standardization and Product Quality Control" confirmed the necessity and usefulness of its study. Nevertheless, the authors realized that the system of training of personnel in questions of the increase of product quality is still far from perfect and does not satisfy the present requirements. For the purpose of improving the training of specialists in this direction it is necessary, in our opinion, to carry out work in the following directions:

1. **The improvement of the organization of the educational process**. It is necessary to adjust the educational schedule so that lecture and practical lessons would be conducted simultaneously (for the present practical lessons are conducted after the completion of the delivery of a series of lectures), which will make it possible to reinforce theoretical knowledge more successfully on the basis of practical lessons.

It is advisable to organize trips of student groups to communications enterprises, which are using comprehensive systems of product quality control and have established quality groups. Practical acquaintance with the organization of the state acceptance of products at industrial enterprises may also be of unquestionable benefit.

2. **The establishment of continuous training in questions of the increase of product quality**. It is necessary to expedite the preparation and publication under the aegis of the USSR State Committee for Standards of a textbook for the course "Standardization and Product Quality Control." However, such a textbook can hardly

reflect the specific nature of all the sectors of the national economy, including the sectors of the production infrastructure. Therefore, on the basis of the basic textbook it seems advisable to write a special textbook for the sectors of the nonproduction sphere (or specially for communications). Moreover, it is necessary to envisage the publication of textbooks through departmental publishing houses.

However, no textbook, especially under the conditions of the radical restructuring of the economy and the rapid introduction of the achievements of scientific and technical progress, can properly reflect everything new that is appearing in this field of knowledge. Therefore, the reflection of all the innovations, which are appearing in the theory and practice of product quality control, is one of the conditions of the increase of the quality of the teaching of the course. The journal STANDARTY I KACHESTVO could assume this function, having made the rubric "Universal Education in Quality" a permanent one.

It is necessary to increase the role of the primary organizations of scientific and technical societies and the All-Union Society for Knowledge in the promotion of advanced methods of increasing product quality. The experience of the delivery of lectures by members of the chair for labor collectives of enterprises and organizations of Voroshilovskiy Rayon of Moscow testifies to the interest, which the audience is displaying in the problem of the improvement of the quality of products in general and goods and services in particular.

Bibliography

1. "In the CPSU Central Committee," PRAVDA, 19 January 1987.

2. Zavyalov, V.P., "The Complaints of the Population Are Symptoms of Trouble," VESTNIK SVYAZI, No 5, 1987.

3. "The Basic Directions of the Restructuring of Higher and Secondary Specialized Education in the Country," PRAVDA, 21 March 1987.

4. Gubin, N.M., and Matlin, G.M., "Kachestvo svyazi: Teoriya i praktika" [The Quality of Communications: Theory and Practice], Moscow, Radio i svyaz, 1986.

5. Mayofis, L.I., and Bronner, Ye.B., "Nauchno-tekhnicheskiy progress i effektivnost proizvodstva v telegrafnoy svyazi" [Scientific and Technical Progress and Production Efficiency in Telegraph Communications], Moscow, Radio i svyaz, 1986.

6. Fuksman, R.L., "The Control of the Quality of Communications in the Telephone Network," in the book "Ekspluatatsiya i remont abonentskikh ustroystv gorodskikh telefonnykh setey" [The Operation and Repair of Customer Devices of Urban Telephone Networks], G.A. Zuyev, L.I. Khachirov et al., Moscow, Vysshaya shkola, 1986.

7. "A Model Thematic Plan of the Instruction of Personnel in Questions of the Increase of Product Quality," STANDARTY I KACHESTVO, No 9, 1986.

8. "Metodicheskiye rekomendatsii po razrabotke i vnedreniyu kompleksnykh sistem upravleniya kachestva produktsii svyazi na predpriyatiyakh otrasli 'Svyaz'" [Procedural Recommendations on the Development and Introduction of Comprehensive Systems of Quality Control of the Product of Communications at Enterprises of the Sector "Communications"], Moscow, Izdatelstvo Minsvyazi SSSR, 1983.

9. "Sovershenstvovaniye khozyaystvennogo mekhanizma" [The Improvement of the Economic Mechanism], Moscow, Radio i svyaz, 1987.

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UDC 001.89

Attachment of Academy Associations for Improvement of Skills

18140115b Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 9, Sep 87 pp 58-62

[Article by V.V. Belousov under the rubric "The Organization and Efficiency of Scientific Research": "An Effective Form of the Increase of the Scientific Skills of Staff Members of Academic Institutes"]

[Text] In 1980 the USSR State Committee for Science and Technology, the USSR State Committee for Labor and Social Problems, the USSR Ministry of Finance, and the All-Union Central Council of Trade Unions on the suggestion of the USSR Academy of Sciences adopted a joint decision on the organization of a system of the long-term attachment of scientific associates to leading scientific institutions of the USSR Academy of Sciences and the academies of sciences of the union republics for the increase of skills. Thus, on the initiative of the USSR Academy of Sciences a new form of the increase of the skills of personnel—from junior scientific associates to deputy directors of institutes—was established in the academic system, which is especially important for many institutions of republic academies and institutions of the USSR Academy of Sciences, which are far from the center.

The basic goals of the attachment of scientific associates are:

—the extension of theoretical training in the field of the natural and social sciences and the mastering of modern methods of conducting an experiment on unique scientific equipment;

—active participation in the research work of recognized scientific schools which are headed by leading scientists of the country;

—the formulation of programs of joint research of various academic institutions and participation in their implementation;

—the fulfillment at a higher level of the assignments on the planned themes of scientific research work of their own institutes;

—the establishment and development of creative scientific contacts, the mutual sharing of experience of research work and scientific information.

In practice this system was put into effect back in December 1980. The USSR Academy of Sciences and the academies of sciences of the union republics were granted the right to attach annually up to 500 scientific associates for a term of up to 12 months, including up to 300 in Moscow and 100 in Leningrad, with the retention of the position held by them at their basic job and the corresponding salary.

In accordance with the statute, which was approved by the Presidium of the USSR Academy of Sciences, scientific associates with a length of independent scientific work of not less than 3 years, as well as the managers of laboratories, sectors, and departments have the right to attachment, but no more often than once every 6 years. If necessary a dormitory is made available to associates from other cities. The accepting party (the leading academic institute) is obliged to provide the attached associates with the appropriate workplace, the necessary scientific supervision, and a scientific research base. It is also established that these associates should enjoy all the rights of a scientist of the institution, to which they have been attached for the entire period of work at it. The accepting institutes bear all the expenses connected with their work.

The Presidium of the USSR Academy of Sciences established the following limits on attachment: to the Siberian Department of the USSR Academy of Sciences and the Ukrainian SSR Academy of Sciences—40 scientific associates each a year; the Uzbek SSR and Kazakh SSR academies of sciences—30; the Belorussian SSR, Georgian SSR, and Azerbaijan SSR academies of sciences—25; the Far Eastern Scientific Center and the Ural Scientific Center of the USSR, the Lithuanian SSR, Kirghiz SSR, and Armenian SSR academies of sciences—20; the Moldavian SSR, Latvian SSR, Tajik SSR, Turkmen SSR, and Estonian SSR academies of sciences—15; each of the affiliates of the USSR Academy of Sciences—13 each. Within the indicated limits there are submitted annually to the Presidium of the USSR Academy of Sciences—to the Council for the Coordination of the Scientific Activity of the Academies of Sciences of the Union Republics—applications for attachment, on the basic of which, with the consent of the accepting party, the Council for Coordination drafts the annual plan of attachment, which is approved by the Presidium of the USSR Academy of Sciences, and them follows its implementation.

It must be noted that the activity of the Council for Coordination in many respects contributed to the appearance and the improvement of the system of attachment. Field sessions of the council, which since 1978 have been organized annually in the union republics jointly with the corresponding republic academies, played an important role here. To date eight field sessions of the Council for Coordination have been held: in Kiev, Tbilisi, Alma-Ata, Tashkent, Tallinn, Kishinev, Yerevan, and Kazan.

In addition to this, long before the start of the holding of field sessions the Council for Coordination regularly sent to the academies of sciences of the union republics, scientific centers, and affiliates commissions of scientists of the USSR Academy of Sciences, who familiarized themselves there with the organization and level of scientific research. As a result it often turned out that at many republic academic institutions, scientific centers, and affiliates the associates, even those having sufficient experience in scientific research work, "are stewing in their own juices" and, therefore, to a certain extent lag in their skills and level of research behind the leading scientific institutions of the USSR Academy of Sciences and, besides that, behind the leading institutes of a number of academies of sciences of the union republics, such as the Ukrainian, Belorussian, and other academies. Thus, it became clear that practical assistance is needed in overcoming this serious shortcoming and in "equalizing" the skills of scientists and the level of research of academic science in the country.

The Council for Coordination and the Personnel Administration of the Academy of Sciences were charged with the practical organization of the system of assignment. The suggestions on the procedure of assignment, which were drawn up by them and were approved by the Presidium of the USSR Academy of Sciences, were supported by the departments and organizations, which were named at the beginning of the article. Thus this form of increasing scientific skills, which by now has completely displayed its effectiveness, emerged.

During 1981-1985 in accordance with the annual plans of assignment to leading institutes of the USSR Academy of Sciences (in Moscow, Leningrad, Sverdlovsk, Novosibirsk, and other cities) and a number of republic academies of sciences more than 1,700 scientific associates increased their skills, among them were 90 doctors and 800 candidates of sciences. These are junior scientific associates without an academic degree and with a

candidate degree, senior scientific associates, managers of laboratories, sectors, and departments, scientific secretaries, and deputy directors of institutes (the last are from Uzbekistan, Tajikistan, Estonia, and the Bashkir Affiliate of the USSR Academy of Sciences). Of the total number of those assigned approximately 60 percent work in the field of the natural and technical sciences and 40 percent work in the field of the social sciences.

The analysis of the work of the system of assignment during the past 5-year period (1981-1985), which was made by the Council for Coordination, showed that the academies of sciences of the union republics and the Siberian Department, scientific centers, and affiliates of the USSR Academy of Sciences participated in it from the first days, but displayed here appreciably different activity. Thus, for example, the Tajik SSR, Kazakh SSR, and Kirghiz SSR academies of sciences used the opportunity of assigning their associates to leading institutes of the USSR Academy of Sciences and the academies of sciences of the union republics with the exceeding of the limits allotted to them. At the same time the academies of sciences of the Ukraine, Belorussia, and Uzbekistan and the Ural Scientific Center used only 70-80 percent of their limits during the 5-year period, the Armenian SSR Academy of Sciences, the Siberian Department, and the Far Eastern Scientific Center—50 percent, the Latvian SSR Academy of Sciences and the Dagestan, Karelian, and Komi affiliates—30-35 percent, and the Kazan and Karelian affiliates—only 6-15 percent.

More than 125 scientific institutions of the USSR Academy of Sciences (including 90 in the natural and technical sciences), first of all those located in Moscow and Leningrad, figured as the accepting party (leading institutes) in the system of assignment during 1981-1985. Among them it is necessary to note the following institutes: the Mathematics Institute imeni V.A. Steklov—40 people were accepted, the Institute of Economics—36, the Institute of Philosophy—35, the Institute of Organic Chemistry imeni N.D. Zelinskiy—31, the Institute of Elementoorganic Compounds imeni A.N. Nesmeyanov—25, the Institute of World Literature imeni A.M. Gorkiy—25, the Botany Institute imeni V.L. Komarov—24, the Institute of Oriental Studies—23, the Institute of Linguistics—23, the Institute of Chemical Physics—22, the Physics Institute imeni P.N. Lebedev—20, the Institute of Earth Physics imeni O.Yu. Shmidt—20, the Zoology Institute—19, the Central Institute of Economics and Mathematics—19, the Computer Center—18, and the Institute of State and Law—18.

Leading institutes of the Siberian Department and the Ural Scientific Center also accepted scientific associates. Thus, during 1981-1985, 35 associates were assigned to scientific institutions of the Siberian Department of the USSR Academy of Sciences for the increase of skills, while 10 were assigned to institutes of the Ural Scientific Center; 3 scientific associates were assigned to institutes of the Bashkir and Kazan affiliates of the USSR Academy of Sciences.

At the Siberian Department the Computer Center, the institutes of catalysis, chemical kinetics and combustion, high current electronics, thermal physics, geology and geophysics, cytology and genetics, and economics and organization of industrial production, and a number of others (20 institutes in all) accepted long-term assignees. At the Ural Scientific Center one should name the institutes of mathematics and mechanics, metal physics, chemistry, electrochemistry, geology, and geochemistry.

Scientific associates were also assigned to leading institutes of the academies of sciences of the union republics, although the total number of those accepted by them during the past 5 years is still not large and, with respect to the possibilities that they have, can be increased significantly. During the indicated period 11 republic academies (the Ukraine, Belorussia, Uzbekistan, Kazakhstan, Georgia, Azerbaijan, Lithuania, Latvia, Armenia, Turkmenia, and Estonia), to the scientific institutions of which about 70 people were sent, joined the system of assignment (as an accepting party).

Their largest number—more than 30 scientists—were accepted by leading institutes of the Ukrainian SSR Academy of Sciences. These are the institutes of mathematics, cybernetics, problems of material science, theoretical physics, electrodynamics, geochemistry and mineral physics, microbiology and virology, botany, and others. In accordance with the plan for 1986 alone the Ukrainian SSR Academy of Sciences accepted 15 people.

At the Belorussian Academy of Sciences eight people underwent assignment. Four scientific associates each were sent to institutes of the Lithuanian SSR, Latvian SSR, and Turkmen SSR academies of sciences, three each—to the Uzbek, Kazakh, and Azerbaijan SSR's, and two each—to the Georgian, Armenian, and Estonian academies of sciences. Among the institutes that accepted one should note: at the Uzbek SSR Academy of Sciences—the institutes of bioorganic chemistry, chemistry of plant substances, and botany; at the Latvian SSR Academy of Sciences—the Institute of Organic Synthesis; at the Turkmen SSR Academy of Sciences—the Institute of Deserts; at the Estonian SSR Academy of Sciences—the institutes of cybernetics and economics.

In 1986 the Biotron Research Complex, which is equipped at a modern level, was put into operation at the Moldavian SSR Academy of Sciences. The management of the Moldavian SSR Academy of Sciences consented to the assignment to the Biotron Complex of up to 15 scientific associates a year.

The scientific institutions of the USSR Academy of Sciences and the academies of sciences of the union republics, to which scientists were assigned during the past 5-year period for the increase of skills, are broken down by sections of the Presidium of the USSR Academy of Sciences in the following manner: the Physical,

Technical, and Mathematical Sciences Section—25 percent, the Chemical, Technological, and Biological Sciences Section—40 percent, the Earth Sciences Section—15 percent, the Social Sciences Section—20 percent.

The experience of the practical implementation of the system of assignment during the past 5 years testifies that it is rated highly by the academies of sciences of the union republics and the Siberian Department, scientific centers, and affiliates of the USSR Academy of Sciences as a new and highly effective form of the increase by scientific associates of theoretical knowledge, the mastering of the most advanced research methods, and the sharing of experience of research work. Steps are being taken to use this system more purposefully. Thus, in its opinion on the system of assignment the Ukrainian SSR Academy of Sciences reports that, as a rule, the most promising scientific associates, who work in the most important specialties and directions and in significant part are a reserve for further advancement, are sent for the increase of skills.

The Kazakh SSR Academy of Sciences reports that the majority of its scientific institutions are displaying great interest in the efficient use of the new system of the increase of skills. In this connection the candidates for assignment are selected very carefully and first of all from among promising scientists, for whom specific goals are set.

In the opinion of the Lithuanian SSR Academy of Sciences it is stressed that candidates are selected for assignment from among promising young scientists, who work in urgent fields of science, which in the republic are poorly developed and for which there is no experimental base for the conducting or completion of important experiments.

As the Moldavian SSR Academy of Sciences reports, during assignment scientific associates of the academy mastered new research methods and began work in new scientific directions. It is stressed that all the associates of the Moldavian SSR Academy of Sciences, who have undergone assignment, speak positively of the effectiveness of this system.

Associates of the Kirghiz SSR Academy of Sciences during the increase of skills at leading institutes of other republics participated in the performance of job work, which, in particular, served as the basis of the conclusion of contracts on creative cooperation of institutions of the Kirghiz SSR Academy of Sciences and the USSR Academy of Sciences.

The Turkmen SSR Academy of Sciences emphasizes that a large number of scientific associates, who were selected for assignment, were subsequently promoted to the positions of senior scientific associates, heads of laboratories, and deputy directors of institutes.

Having analyzed the effectiveness of the system of the assignment of scientific associates during the 11th Five-Year Plan, the Council for Coordination rated the achieved results as positive. With respect to 11 republic academies of sciences (the Ukrainian SSR, the Belorussian SSR, the Uzbek SSR, the Kazakh SSR, the Lithuanian SSR, the Moldavian SSR, the Latvian SSR, the Kirghiz SSR, the Tajik SSR, the Turkmen SSR, and the Estonian SSR) the scientific associates, who underwent during 1981-1985 assignment to leading institutes of the USSR Academy of Sciences and the union republics, during the time of assignment and subsequently successfully defended 30 doctoral dissertations and prepared 43 for defense, while about 100 scientific associates began work on doctoral dissertations. In all 32 candidate dissertations were defended, more than 40 associates are working on them. A total of 30 scientific monographs and a significant number of scientific articles were completed and published.

Thus, even the comparatively modest experience, which has been gained thus far, testifies that the new system of the assignment of scientists to leading academic institutes is making a significant contribution to the increase of the level and efficiency of scientific research and will undoubtedly contribute to the accomplishment of the important tasks, which were posed for science of the country by the 27th CPSU Congress and the June (1986) CPSU Central Committee Plenum.

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Tekhnikum Training Criticized by Graduates, Students, Officials

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian Sep 87 p 2

[Series of comments published by Department of Science and Technical Progress of SOTSIALISTICHESKAYA INDUSTRIYAin the column "The Technician and Acceleration": "There Are 19,000,000 Million of us"; last paragraph is editorial roundup]

[Text]**G. Minin:** A single complex could be formed from a VUZ and a tekhnikum with successive mutually supplementing programs of instruction.

V. Kozlov: The army does not try to use tekhnikum graduates according to their specialties. It obliges them to retrain, after which they do not return to us.

M. Manova: It is not right when a future electrician is forced to work as a bookkeeper in practical training, as was my case.

B. Antropov: Before speaking of a decline in the prestige of the technician, it is necessary to pinpoint what position in production or at a scientific-research institute he can aspire to.

N. Shlyakhov: In sectors, tekhnikums can serve perfectly as centers for training and upgrading qualifications of middle-level specialists.

V. Baydenko: One of the acutest problems of tekhnikums is teachers. How to attract talented teachers and get rid of casual people?

N. Prilipkin: A komsomol member is duty bound not to be a passive recipient of knowledge but to prepare himself for problems which await him in production.

A. VYALKIN, senior tekhnician at the All-Union Avtogenmash Scientific-Research Institute:

I graduated this year from Moscow Machine-Building Tekhnikum. When I came to work at the All-Union Avtogenmash Scientific-Research Institute, I was offered the position of a laboratory worker with a salary of 90 rubles a month. You will agree that the question would arise in any individual: was it worth the while studying for 4 years and trying to get a diploma cum laude? I had to put up a fight for them to entrust me with design work.

It is not just a case of low salaries for graduates. On entering the tekhnikum, we thought: although it is not a VUZ, at least we can obtain a secondary education and a technical specialty. But as the time drew closer to a diploma, many began to think: but what will we be? Workers? Brigade workers? Foremen? The subjects that we studied did not provide an answer to this question. And today many of my classmates complain that they lack the the ability to work with people. And I myself feel that the drafting course which I took at the tekhnikum is manifestly poor for the work of a designer. So you start to doubt: has not our vocation become obsolete, is there a place for it in the world of the present-day technician?...

Young specialists after a tekhnikum acquire only a third or fourth category. They cannot compete with workers and more readily go after engineering positions. But here too there is a problem—their knowledge is inadequate. The time has come to clearly determine the place and functions of a technician in production. So far he has been unable to have his own lawful place—the problems will remain.

V. SHIPUNOV, collegium member of the USSR Ministry of Higher and Secondary Specialized Education:

The party and the government pay a great deal of attention to school reform. Important decrees have been enacted on restructuring higher education. The time has come to seriously deal with the "intermediate" level—secondary specialized educational institutions. The Soviet system of these educational institutions is unique in the world not only because of traditions and scale but because it solves a dual problem: it carries out the training of the largest mass category of specialists in terms of numbers and at the same time it provides its graduates with a general secondary education.

Today the secondary specialized school faces the problem of not so much expansion of the scale of training personnel but of the qualitative renewal of the contents and methods of instruction. It is necessary to have the profile of training specialists approximate as much as possible the requirements of practice.

A. KOBZEV, deputy ministry of the automotive industry:

In motor-vehicle building, almost 40 percent of the engineering, technical and supervisory positions are occupied by technicians. This is a tremendous force. And we believe that the technicians' role will grow. Everybody knows that the rate of technical progress is largely determined by the engineering base. It must include a kind of bloc where ideas are generated and the basic directions of their realization are worked out. Next you have a group of people who incorporate these ideas. This is a second group which in our opinion must be basically staffed with technicians. In other words, with people who can and do perform calculations, make drawings and with their own hands fabricate and assemble a new machine. Talented, trained technicians need to be used in the solution of such creative problems. With complication of production—and this is where it is going—the role of technicians will also increase in it. It seems to me that in distinction to engineers, they are closer to real life. In our case, for example, technicians work at those work stations where a great volume of knowledge is required. They service robotic complexes, machine tools with numerical control and flexible automatic systems. This is a necessity dictated by the level of modern equipment. It is time to reject the obsolete view that a specialist with a diploma must be at least a minor, but without fail, a chief....

G. YAKIMOVICH, chief of a department of the USSR State Committee for Labor and Social Problems:

Today about one-third of a million persons with a secondary specialized education work in fields far from the vocation they obtained. This is an alarming symptom forcing us to think that all is not well with us in the use of tekhnikum graduates. Apparently, it is necessary to bolster the goal-oriented training of specialists on the basis of orders of enterprises. Such a form of interrelationships already exists, but so far it is in an embryonic state.

On the other hand, 40 percent of our engineering positions are occupied by persons with a secondary education. Such a situation did not come about because of good living. In order to retain a good technician, it was

found necessary to appoint him to an engineering position. Now with the transition to the new system of management, the enterprise director will determine himself who suits him better. And all pay difficulties in positions will have to be eliminated. These measures will serve to bolster prestige.

Among the outlined changes in the wage system of engineering and technical personnel, for technicians in particular the first and second category are being introduced. Now their minimum salary will be equal to 110 rubles and the maximum to 160. Heads of enterprises will be able to establish pay increases of up to 50 percent of salary. We still have to determine more precisely in what worker and engineering positions it will be possible to use specialists with a secondary technical education.

A. SHCHELOKOV, a student at Podolsk Industrial Tekhnikum:

At many tekhnikums, so much obsolete equipment is to be found in many manual-training workships that it practically makes no sense to master it—enterprises are equipped with much more modern machine tools and production units. The question arises: why can't they share this equipment with tekhnikums?

Someone might say to me that production itself is experiencing a shortage of good machines tools without which you cannot make good products. Then let us manufacture them rather than engage in making training objects. Work can be so organized that we would work at modern equipment directly in the shops of an enterprise. And at the same time acquaint ourselves with its life and problems. Both the enterprise and the tekhnikum would gain. Without this, the result is that in the training process we become backward.

I would bring up the question not only of production output. Our diplomas should be defended not for pro forma's sake but rather by taking on some bottleneck in production and trying to eliminate it. For the introduction of such diploma work, a tekhnikum could get part of the economic effect. And it would install discipline in the young people and oblige them to approach a problem more responsibly.

N. DROZDOV, deputy minister of ferrous metallurgy:

I am grateful to fate for having started my way to my specialty from a tekhnikum. The knowledge and skills obtained there have served me all my life as an invaluable aid in work. I remember that many wanted to become foremen immediately on completing a tekhnikum, but we were assigned to work as brigade workers. We felt hurt. But later we understood how right our first teachers were. The fact is that after completing a tekhnikum a person still does not have sufficient practical know-how nor the ability to work with people. On appointing such a person as a foreman, he would fail ignominiously. And there is no way of knowing how his life would shape up after such a failure. In working as brigade workers, we acquired the necessary experience. And the knowledge obtained at the tekhnikum did me a service even at the time of study at a VUZ: in the first courses, I passed many subjects without particular effort, almost without preparation.

In my opinion, every future specialist must go through a tekhnikum. After this, at the VUZ and in production, he will be a welcome guest. Approximately 300,000 technicians work in ferrous metallurgy. Half of them are in supervisory positions and the other half at work stations. And I see nothing bad in this. Among tekhnikum graduates, most highly skilled workers are to be found. I am certain that the more complex equipment and outfitting of production becomes, the greater will the demand be for using graduates of secondary specialized institutions.

L. SHVETSOVA, secretary at the Komsomol Central Committee:

Almost all enterprise managers agree on the fact that tekhnikum graduates lack the know-how for organizational work and the ability to supervise people. But what can they do if we decide everything for them from the time they are students? It is no accident that at the 20th Komsomol Congress, one of the chief questions was that of development of self-management and participation of students in the affairs of their collective.

Today we are concerned with the state of affairs of komsomol organizations of educational institutions. At tekhnikums and at VUZ's nobody for all practical purposes listens to the opinion of the young people. At best, they solve some questions of minor importance. Yet it would be nothing bad if young people were consulted how best to compile a schedule or organize the teaching process. At the congress, they said that students should take part in summarizing results and in evaluating the work of their comrades and even of teachers. And even now a document has been adopted permitting students, true, so far only of [illegible]'s, to express their opinion in anonymous form concerning how a teacher provides instruction. In development of self-management and democratization of the life of educational institutions, we see that factor that would make it possible to increase the activeness of future leaders of industry and develop in them organizational qualities and the ability to defend their own opinion. In a word, they will be a lot better prepared for practical life.... We must always remember that the specialist can be taken in many ways. And his becoming depends on the sum of the components.

S. KOROBOV, director of tekhnikum for building radio apparatus:

Many people believe without any basis that the specialty of technician is a dead end. Right after completing his studies, he usually receives 100-120 rubles a month. But hardly anyone will agree to spend all his life for such pay. There is but one choice: either to try to get into a VUZ so

as to go on studying or become a worker. For a person to bear the title of technician with dignity, he basically needs not only to boost his earnings but to clearly determine what his prospects are.

Meanwhile we constantly run into facts to the fact that our graduates are being used in unskilled positions. It is necessary right now to think of ways of solving this. Otherwise we could find oursesives facing a problem where tekhnikum graduates are not needed by anyone.

N. GALAKTIONOV, director of Moscow Carburetor Plant:

From the speech of the chairman of the USSR State Committee for Labor and Social Problems, one might get the impression that the problem of technician's pay has been resolved. This is not quite so. Categories and pay increases have been introduced, but they have been once more enmeshed in all sorts of instructions which do not permit paying people for their contributions. I believe that it is necessary in general to remove all restrictions in this matter. Why must I pay less to a knowledgeable technician than to a so-so engineer?

We recently conducted sociological studies. They showed that foremen with a higher education are satisfied today with their salaries but not with the character of the work. They think that they could do something bigger and usually try to go to a scientific-research institute or to a design bureau. Yet specialists with a secondary technical education working in engineering positions as a rule are satisfied both with the character of the work and the salary. For this reason we have to gamble on technicians. I have a registry of all specialists with a secondary technical education. I rely on it.

Heads of enterprises who share this viewpoint are deeply interested in upgrading the level of technicians' training. It is apparently now necessary to carry out certification of actual secondary education institutions. The time has come to answer the question without embellishment: who trains what specialists where? Unnecessary tekhnikums need to be eliminated, some to merge and others to be bolstered. The time has come to proceed to more flexible forms of organization of specialists' training.

As we see, the participants of the round table are unanimous in that many unresolved questions are to be found both in the use of graduates of secondary specialized educational institutions and in the system of their training. This also applies both to the technician's job in production, and remuneration of his labor, and restructuring of the operation of tekhnikums, and equipping them with modern technical equipment, and recruitment of qualified pedagogic personnel, development of self-management and much else. Consequently the editorial office plans to continue the discussion under the heading "Technician and Acceleration." We invite the participation of students, tekhnikum graduates and teachers, heads of enterprises and departments, scientists and representatives of the public. Your responses and proposals will help select the most rational ways of solving the propounded questions.

Department of Science and Technical Progress of SOTSIALISTICHESKAYA INDUSTRIYA.

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Patent Experts to Aid Designers

18140162 Moscow IZVESTIYA in Russian 18 Dec 87 p 2

[Article by engineer Ye. Temchin under the rubric "From the Editorial Mail" (Moscow): "The Plant Needs a Patent Expert"]

[Text] In our country a system of patent information has been organized and is operating. In its data banks there are more than 20 million pieces of information. They converge here from throughout the world. Specific knowledge and skills are needed in order to use the services of this system. It is with this that things are poor. Why? Because the developer of a new thing often does not have the corresponding training. This is first. And, second, the patent expert cannot always aid the developer substantially.

The previous lack of understanding of the significance of patent sources in the system of the national economy is entirely explicable. We traded little with foreign countries in finished industrial products. For the most part we worked for the domestic market. Now entirely different tasks are arising. Without patent services, which are manned by competent specialists, it is impossible to accomplish them. Wherever these services are developed, there they produce truly new equipment, use new technology, and sell licenses. The Institute of Electric Welding imeni Ye.O. Paton and other leading enterprises and institutes can serve as examples of this. Their patent services not only help the creators of what is new in obtaining patent information, but together with them also make an evaluation of the technical level of the product being developed, study the patent and license conditions, and, of course, work on tasks which are connected with the protection of priority. All this is very difficult and requires multipurpose training and considerable abilities.

If at the time, when they were developing one of the mass machine tools of the 1930's, which is known by the name DIP, a patent expert had worked alongside the designer, a different, more advanced machine tool would have appeared. Why? Because the patent expert would have helped the designer to determine its technical level. Using information on the inventions being developed in the world, he would have said to the designer: "See how this firm made the spindle group. Your machine tool for the present is inferior to the foreign one. I cannot give this design the go-ahead." Alas, during those years there were no patent experts alongside developers, and the system of patent information did not exist.

Since that time much has changed. An enormous scientific and technical potential has been accumulated in our country, and we should use it efficiently in order to outdistance those, with whom we have not yet caught up. But the burden of past years is heavy. And the changes, which should occur in consciousness, are most difficult of all.

Judge for yourself. Last year the State Committee for Inventions and Discoveries made a one-time accounting of the state of the patent services in the country. A very dismal picture was revealed. Only 42 percent of these services are independent, the others belong to very different subdivisions. And the people working there cannot deal fully with patent and license affairs. Well, what can two or three patent experts do, if at the design bureau, which is serviced by them, there are several hundred designers? Here any research of a world technical level, the determination of patent conditions, the prediction of the inventing activity of competing firms, and license and commercial research are also out of the question.

A patent group existed for many years at the Zaporozhye Kommunar Plant, in the administration of the main designer, where several hundred people work. In addition to its manager, there were two other people there. The designers, of course, did not receive from it any real assistance, except in the drawing up of applications. They did not patent their inventions abroad, the sale of licenses was also out of the question.

But then 2 years ago it was decided to establish an independent subdivision—a patent division. They invited experienced engineer and patent expert V. Suzdalenko to manage it. And even chief designer Vladimir Petrovich Steshenko himself said to me at that time that personally he was not 100 percent confident of the great benefit of the new division, although he was himself the initiator of its formation.

After a while he said: "You know, they decided to check the new model for patent purity. The entire, absolutely entire model. We never did this." And a while later: "The machine is absolutely patent pure. It is possible to sell it abroad without worry."

In previous times the Zaporozhye designers on the average submitted annually 20 applications for inventions, of which they received inventor's certificates only for 10. Now they submit more than 50. On the order of 40 of them are inventions. This testifies: the people have gotten a taste for invention, this is first. And, second, the patent experts are giving them skillful assistance.

But the matter is limited not only to this. Having patent information, they are showing the directions, in which new technical solutions should be sought.

The people of Zaporozhye have changed psychologically with respect to patent and license affairs. But how many institutes and enterprises, the managers of which never understood what a patent service is, remain in our

machine building complex! How do we machine builders intend to accomplish the tasks of the retooling of the sectors and the output of products, which are competitive on the world market?

And again I will turn to the figures.

One of the recent checks, which were made by the State Committee for Inventions and Discoveries, revealed, for example, that at institutes and plants of the Ministry of Instrument Making, Automation Equipment, and Control Systems the number of patent experts comes to only half a percent of the total number of scientists and engineering and technical personnel and that at several enterprises and institutes there are no patent subdivisions at all. And here is the result. The check for patent purity and patentability of 48 objects, which were included in the state plan, showed that 18 in their technical and economic indicators are inferior to foreign analogs, while 18 do not have patent purity at all and, consequently, cannot be an object of export.

The situation in a number of other ministries and departments is also no better.

But recently Suzdalenko was here. "How disgraceful this is!" he began at the threshold. "They do not want to understand anything!" And he placed a pile of papers on the desk. This was the correspondence with the USSR State Committee for Labor and Social Problems. More than 2 years ago the order that in the remuneration of labor patent experts are to be put on the same level as specialists, on whom the fate of scientific and technical progress directly depends, was issued.

And now I read the latest response of the State Committee for Labor and Social Problems: "...Taking into account the important role of the workers of the division of the main designer and the main process engineer in the acceleration of technical progress...the salaries of the indicated category of workers have been established higher than those of the workers of patent subdivisions." B. Gavrilov, deputy chairman of the committee, signed this response.

"We had pinned such hopes," the upset Suzdalenko says to me. "We had hoped to attract experienced designers and process engineers to the division. Who will comes to us now?!"

Here is the restructuring of consciousness for you.

7807

Paperwork Reduction at Voronezh Special Design Bureau

18140095 Moscow EKONOMICHESKAYA GAZETA in Russian No 42, Oct 87 p 23

[Article by I. Zhabin, chief of a division of the Voronezh Special Design Bureau of Forging and Pressing Machines and Automatic Lines of the ENIKmash Scientific Production Association, and *Ekonomicheskaya Gazeta* correspondent V. Zhuravlev (Voronezh): "Losses According to...the Standard, or How Writing Swamps the Designer"; first paragraph is *Ekonomicheskaya Gazeta* introduction]

[Text] According to calculations of the workers of the Voronezh Special Design Bureau of Forging and Pressing Machines and Automatic Lines, the submitting for approval and the official stamping in various instances of all kinds of documents, reports, protocols, notices, and certificates take up at the least 30 percent of the working time of a designer. The problem, alas, is not new. However surprising it is, the losses of time are sanctioned by the standards, by which developers are forced to abide in the process of developing new machines.

It is possible and necessary to reduce such enormous unproductive losses. The decree of the USSR Council of Ministers "On the Improvement of the Procedure of the Drafting and Coordination of Technical Documentation in Case of the Development and Delivery to Production of a New (Modernized) Product of Machine Building," which was adopted in January 1986, aimed the USSR State Committee for Standards precisely at this. However, the paper flow as before is swamping designers.

The USSR State Committee for Standards, for example, was ordered to eliminate by 1 March 1986 from state standards "The Procedural Provisions, Which Regulate Questions of the Performance of Work in Case of the Development and Assimilation of New Equipment, While Intending to Include Them If Necessary in Documents of a Recommendatory Nature." But as before designers are forced to abide by the all-union state standard, which gives the most detailed instructions to the developer on how it is necessary to write an operating manual for machines. The all-union state standard takes up 74 pages! At every step there are the word combinations: "should contain...," "should be...." But a CEMA standard has been written on this very theme. It contains only nine pages, and all of them in reality are of a clear recommendatory nature. A certain paradox results. A short operating manual for a machine, which has been purchased in the fraternal countries, entirely suits us. And we accompany our machines to the CEMA countries with the manual which has been drawn up in accordance with the CEMA standard. But when developing equipment for domestic use, the designer for some reason is obliged to spend sevenfold more time on drawing up the same operating manual!

Or take the All-Union State Standard "Repair Documents." On 45 pages it requires the designer to write this and that. For comparison let us once again note: the corresponding CEMA standard takes up only six pages of recommendatory text, while entrusting the developer at his own discretion to indicate the most important things in the operation of the equipment developed by him. And this is entirely correct: no one knows better than the developer his creation. The responsibility not only for the reliability and quality of the design developed by him, but also for the exhaustive informative nature of the accompanying documentation always rests on him.

Now it is a question of the maximum use of computers and universal computerization. It is also logical to transfer a portion of the paperwork of the designer to the shoulders of the computer. At the ENIKmash Scientific Production Association they did that, having commissioned the "electronic brain" to draw up a large amount of repetitive documents: all kinds of certificates, an enormous number of references on the price and patent purity, and certificates of the expert commission. All this information is stored on floppy disks. If necessary, you take one and print out the necessary documentation. They are taking them and printing it out. But then...they retype on a typewriter what the computer has already printed out. Why? According to the assertion of the State Committee for Standards, documents, which have been executed by computers, store poorly. It is strange. In the same All-Union State Standard "The General Demands on Textual Documents" it is written that a printout from a computer is official for technical and design documents. It is another matter that another all-union state standard, "The Structure, Presentation, Design, and Content of Standards," which obliges the developer to submit documentation, which is only typed or handwritten, contradicts, in point of fact, this all-union state standard. Is it not absurd in our technical age?!

But meanwhile the bringing of the latter of the named all-union state standards in line with the spirit of the times would enable the staff members alone of the ENIKmash Scientific Production Association to reduce by 30-50 percent the time of rough work when drawing up the draft of a state or sectorial standard and specifications for one item or another. How much time is being wasted at all the planning and design organizations of the country! Probably no one has yet calculated this.

The streamlining of the Unified System of Design Documentation, which was introduced in the country about 15 years ago and since then has not undergone any changes, will also help to reduce significantly the losses of time. In the opinion of designers of the ENIKmash Scientific Production Association, it is possible to comfortably complete the drawing of simple parts two- to tenfold more rapidly and parts of average complexity 10-30 percent sooner and as a whole to shorten the time of the drafting of a plan by a minimum of 10 percent and, in individual cases, to one-half. But for this it is

necessary to simplify the notation. If this is done in a thought out manner, the quality of design documentation will not suffer in the least.

A small example. Our smallest format is No 11. On it we place a simple part and should collect six signatures: drawn up, checked, technical control, accepted, standard control, approved. However, on the same format No 11 it is possible to give exhaustive information on 15 simple parts like bushings, washers, and parallelepipeds. As this is also done in many countries of the world.

The stamp on format No 11 takes up a very substantial area of paper. But the most offensive thing consists in the fact that usually one, at most two people check such a drawing. The remaining four scribble their signature on the document without looking. The procedure seems to be short, but all these minutes in the end add up to hours of time that has been lost for designing. So why not leave on drawings of format No 11 only one signature: "drawn up"? What a saving of time and paper for the country!

It is also incomprehensible why the Unified System of Design Documentation requires that there be written on each drawing phrases of the type: "The unindicated limits of size are to be calculated in accordance with the 14th accuracy rating," "Mark the designation of the drawing on the tag," and the like. Is it really impossible to stipulate this once and for all in the corresponding all-union standard and not to waste the labor and time of the draftsmen and developer?

In recent times for the reduction of the amount of scientific and technical documentation designers have been permitted not to produce specifications at the stage of the prototype, but all the requirements have been transferred from the specifications to the technical assignment. Moreover, the developer is obliged to write a program and the method of tests, which corresponds to the size of the same specifications. A card of the evaluation of the technical level and quality of a product is drawn up three times (!) for an item. Ideally it is the document which objectively evaluates the given item with respect to the world level.

But here is what the opinion on this score of R. Dezhurov, head of a sector of the ENIKmash Scientific Production Association, is:

"No one has seen a poor card of the level, but there are many poor machines. It seems that the orientation toward the card of the level is not entirely correct. The consumer, his opinions and the efficiency of the use of the machine at enterprises, and the cases of sale for export should determine the level of a machine. It is necessary to eliminate the card of the level."

By the admission of many developers of the ENIKmash Scientific Production Association and other design organizations, the card of the level has gradually turned not into an evaluation of the quality of a machine, but into an evaluation of the quality of the drawing up of documents for it.

Is such a luxury justified? For a large amount of time, of which at times developers simply do not have enough in order to bring their product up to a truly world level, is also being used for the submitting for approval and official stamping of the card in the corresponding instances.

7807

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Activity of Standardization Services
18140049g Moscow STANDARTY I KACHESTVO in Russian No 9, 1987 pp 89-92

[Article by F.A. Feldman and T.V. Goncharova, the All-Union Scientific Research Institute of Standardization, under the rubric "New Enforceable Enactments": "The Basic Directions of the Activity of Standardization Services in the Country (Main and Base Organizations)"[1]]

[Text]

The Model Statute on the Base Organization for Standardization (50-1.624-86)

In contrast to the main organizations for standardization, the base organizations for standardization are established for the carrying out of the scientific and technical supervision of the work on the standardization and unification of the groups of products (or other objects of standardization), which are attached to them, and the assurance of technical unity with respect to them in the national economy of the country (the union republic).

The base organizations for standardization are appointed from among the main organizations for types of products (main scientific research institutes, scientific and technical centers, main design bureaus, and others) and are all-union (republic) services of standardization, that is, are organizations, which along the lines of the USSR State Committee for Science and Technology guarantee the scientific and technical level of the product being developed, while performing at the same time the functions of base organizations for standardization.

The base organization for standardization is the central nucleus of the entire system of standardization in the sector.

Being the developer of state standards for the general demands on the groups of products, which are attached to it, or on its individual types, the base organization for standardization implements state technical policy with respect to the attached themes. On the one hand, it collects all the latest achievements of science, technology, and advanced know-how and, on the other, actively, on a planned basis, ensures their extensive introduction through standard technical documentation.

In accordance with the Model Statute, the base organizations for standardization should ensure the conformity of the indicators, which are established in the standard technical documentation, to the requirements of scientific and technical progress and to the world level.

Thus, in spite of the fact that the main organizations for standardization bear responsibility for the fundamental national economic policy being formulated, there rests on the base organizations for standardization, owing to the functions performed by them, personal national economic responsibility (and it is greater than that of the main organizations for standardization) for the acceleration of the pace of the increase of product quality and the increase of its technical level, which is a direct consequence of the increase of the scientific and technical level of the standard technical documentation which is drawn up by the base organization for standardization.

In other words, the base organizations for standardization should incorporate in the standard technical documents, which are drawn up by them, truly advanced scientific and technical requirements, moreover, they should direct their attention not to the achieved indicators, but to the long-range indicators, those which it is still proposed to achieve, that is, the base organizations should ensure the development of the optimum system of standard technical documentation on the group of products, which is attached to them.

Based on what has been said, in the Model Statute on the Base Organization for Standardization there is established:

1. The base organization for standardization includes the directions of activity, rights, and duties in the statute on its own organization subject to the specific nature of the groups of products, services, or other objects of standardization, which are attached to it.

2. The establishment in the base organization for standardization of a scientific research (design and technological) division (laboratory, bureau) of standardization for the scientific and technical supervision of the work on the standardization of the group of products, which is attached to the base organization for standardization, as well as for the direct performance of work on standardization and unification in this organization.

3. The performance by the subdivisions of the base organization for standardization of work on standardization in conformity with the plan of standardization, which is a component of the thematic plan of the organization.

4. The managers of the base organization for standardization, as well as the managers of the corresponding subdivisions (services) of standardization, which are established in the base organization for standardization in accordance with established procedure, in the directions of activity, which are attached to them, bear responsibility for the organization and performance of the work on standardization and unification.

Among the basic directions of the activity of the base organization for standardization it is possible to name the following:

—the carrying out of the scientific and technical support of the development of the system of standard technical documentation for the groups of products (or other objects), which are attached to it. For the accomplishment of this task the base organization for standardization should:

1. Perform scientific research, experimental design, pilot technological, and experimental work, which is necessary for the establishment of the standard technical base of the sector with respect to the groups of products (or areas of activity), which are attached to it.

2. Participate in the scientific research work on the determination of the scientific and technical level and prospects of development of the groups of products produced in the USSR and abroad, which are attached to the base organization for standardization; analyze the experience of its production and use (scientific achievements and the prospects of development of other objects of standardization), as well as the experience of domestic and international work on standardization in this area; participate in the performance of scientific research work on the determination of the methods and the optimum level of the standardization and unification of the attached groups of products (or other objects of standardization) and provide the corresponding information to the organizations that are the developers of standards and specifications.

3. Ensure the comprehensive standardization of industrial products, materials, raw materials, components, and tools and coordinate the work on standardization with the requirements of the national economy, the defense of the country, and export. Make contact with the institutes of the USSR State Committee for Standards (the USSR State Committee for Construction Affairs), the main organizations for standardization and the base organizations for standardization of related sectors of industry, and the representation of the client (the basic consumer) on this question.

4. Carry out the scientific, technical, and organizational methods supervision of the work on standardization at enterprises and scientific research, planning and technological, and design organizations in conformity with the specialization of the base organization for standardization. Give technical assistance to enterprises in introducing the standards that have been developed by the base organization for standardization.

—the assurance of the high scientific and technical level of the standards and specifications for the groups of products (or other objects), which are attached to the base organization for standardization, and the inclusion in them of requirements, which correspond to the world level, international standards, and promising scientific and technical achievements. Here the base organization for standardization:

1. Ensures the increase of the level of efficiency of the performance of work on the standardization and unification of the groups of products (or other objects). Ensures the increase of the productivity of labor and its quality when drawing up standard technical documentation by the use of automation equipment and computer hardware.

2. Formulates suggestions on the planning documents and plans of standardization for the groups of products (or other objects), which are attached to the base organization for standardization. Specifies the demands on the supply of raw materials, materials, semifinished products, and components, which are used when producing the product attached to the base organization for standardization, and formulates suggestions on the plans of the state and sectorial standardization of related sectors of the national economy for submission to the main organization for standardization.

Examines analogous demands which are made on a product, which is attached to the base organization for standardization, to other ministries (departments), and to their organizations and enterprises.

3. Formulates suggestions with respect to the attached group of products (other objects) for scientific and technical comprehensive programs on the increase of product quality and reliability in the area of:

—the forecasting of the indicators of the technical level and quality of the most important types of products with allowance made for the requirements of international standards, which ensure their competitive ability;

—the drawing up of standard technical documentation, which establishes the long-range demands on the product and the organization and extents of tests.

4. Performs the scientific research, experimental design, and pilot technological work, which is necessary for the formulation and introduction of standards with requirements of the world level with respect to the attached groups of products, as well as participates in the formulation of the scientific and organizational methods principles of standardization in the sector.

5. Draws up drafts, which correspond to the world level, of CEMA standards, international standards of the International Organization for Standardization and the International Electrotechnical Commission, state, sectorial, and republic standards, and other documents for guidance with respect to the attached groups of products (or other objects), including supplements to standards.

6. Participates in the work on the creation of organizational methods and general technical sets of standards.

7. Makes a scientific and technical evaluation and a legal evaluation of the drafts of standards, which are submitted by developing organizations for the purpose of checking the conformity of the requirements, which are cited in them, to the world level, to the highest achievements of domestic and foreign science and technology, and to advanced know-how; carries out the monitoring of the conformity of the drafts of standards for general industrial products to the needs of the defense of the country and export, as well as the monitoring of the assurance of the patent purity of the drafts of standards, which are being drawn up.

8. Performs work on the determination of the technical and economic efficiency of standardization and unification.

9. Performs work on the accounting of standard technical documents and the changes to them, carries out work on the accounting and registration of standards and specifications and the changes to them for the product attached to the base organization for standardization.

Prepares for publication and on the instructions of the ministry (department) carries out the organization of the publication of sectorial standards and documents for guidance on standardization and their supply to interested organizations and enterprises, the management of the subscriber registration of standards and specifications, the drawing up and submitting to the organization for the supply of this ministry (department) with standards of orders for standards and documents for guidance on standardization.

10. Performs work on the planned checking, revision, change, and repeal of standards.

—the performance of work on the assurance of the introduction and observance of standards with respect to the groups of products (or other objects), which are attached to it. When fulfilling this direction of the work the base organization for standardization should:

1. Compile suggestions for the plans on the introduction of standards for the product (services or other objects), which is attached to the base organization for standardization, for inclusion in the plans of development of the sector.

2. Formulate suggestions for the plans of state inspection and departmental monitoring of the introduction and observance of standards and specifications for the attached group of products (or other objects).

3. Participate in the spot checks of the quality of the products produced by enterprises, which are made by organs of the USSR State Committee for Standards and the quality inspectorate of the ministry (department).

4. Draw up (with the enlistment of organizations and enterprises) drafts of lists of items and materials, which are permitted for use when developing a product.

—the performance of work on international standardization. For the purpose of implementing this direction the base organization for standardization:

1. Organizes the work or participates in the work of the permanent Soviet sections (PSCh's) of the technical organs of the International Organization for Standardization and (or) the International Electrotechnical Commission, which are attached to them. Ensures the participation of its representatives in the work of the permanent Soviet sections of the technical organs of the International Organization for Standardization and (or) the International Electrotechnical Commission, which are attached to other organizations for related themes. Performs the functions of the secretariat of the technical organ of the International Organization for Standardization and (or) the International Electrotechnical Commission.

2. Draws up drafts of international standards of the International Organization for Standardization and the International Electrotechnical Commission and CEMA standards, of which the USSR is the author, as well as prepares conclusions on the drafts of international standards and CEMA standards, of which other member countries of the International Organization for Standardization and (or) the International Electrotechnical Commission and CEMA member countries are the authors.

3. Performs work on bilateral scientific and technical cooperation in the area of standardization, including on the bilateral unification of the standard technical documentation of the USSR and foreign countries.

4. Analyzes the conformity of the indicators, norms, and requirements of USSR standards to international standards, the backing by CEMA standards of prevailing multilateral and bilateral contracts and agreements with respect to the attached product, which is liable to mutual deliveries, as well as the coverage by CEMA standards of the basic product that is constantly produced and formulates on the basis of the analysis suggestions on the plans of standardization on the use of CEMA standards and international standards of the International Organization for Standardization and the International Electrotechnical Commission in the economy.

5. Directly performs and ensures the performance at subordinate enterprises of research and development, which are necessary for the use of the international standards of the International Organization for Standardization and the International Electrotechnical Commission, CEMA standards, and standards that have been unified on a bilateral basis.

In conformity with the Model Statute the management of the ministry (department) can grant the base organization for standardization the right:

1) to turn on questions of standardization to the corresponding subdivisions of the ministry (department), the USSR State Committee for Standards, and other ministries (departments), to enlist in consultation with them enterprises, organizations, and individual specialists in the drawing up of drafts of plans of work on standardization, drafts of standards, and other standard technical documentation, as well as for consultations and participation in conferences on standardization;

2) to approve on the instructions of the ministry (department) the technical assignments for the drawing up of drafts of sectorial (republic) standards and to adjust (within the deadlines of completion of the work) the deadlines of the fulfillment of individual stages of the work, which have been established by the technical assignment that was approved by the base organization for standardization;

3) to act as representative on behalf of the ministry (department) and on its instructions in the USSR State Committee for Standards and other organizations, as well as to act as representative on the instructions of the ministry (department) at conferences of the organs of international organizations (CEMA, the International Organization for Standardization, the International Electrotechnical Commission) on questions of standardization;

4) to make decisions in accordance with the results of the scientific, technical, and legal evaluation of standards and documents for guidance on standardization, which are mandatory for enterprises and organizations of the ministries (departments), on the sending for approval of the submitted drafts of standards and other documents on standardization or on their return for modification;

5) to demand from organizations and enterprises and from ministries (departments) materials and other information on questions of standardization and unification, which are necessary for the fulfillment of the duties of the base organization for standardization;

6) to submit to the ministry (department) a conclusion on the quality of the work performed by organizations and enterprises of the ministry (department) on the standardization and unification of products (services), which are attached to the base organization for standardization, and the suggestions on the elimination of the identified shortcomings and on the giving of incentives to the organizations, enterprises, and individual workers, who ensure the fulfillment of work on standardization and unification at a high scientific and technical level;

7) to obtain in accordance with established procedure the standard technical documents that have been approved by other ministries (departments).

Footnote

1. Conclusion. See the beginning in No 8.

7807

Standard Technical Documentation Collections at Enterprises

18140049f Moscow STANDARTY I KACHESTVO in Russian No 9, 1987 pp 93-94

[Article by B.M. Aksenov: "On the Supply of Enterprises of the Oblast With Standard Technical Documentation"; first two paragraphs are *Standarty i Kachestvo* introduction]

[Text] From the editorial board. The urgent question of the acquisition of collections of standard technical documentation at enterprises is touched upon in the note of B.M. Aksenov, which is offered to the attention of the readers.

The editorial board hopes that specialists of the State Committee for Science and Technology and the Association for the Supervision of Scientific and Technical Information and Propaganda in the RSFSR will report their opinion on the means of solving this problem.

The acquisition of a collection of standard technical documentation at organizations and enterprises, its processing, and the supply of associates of enterprises with the necessary documents are one of the most important tasks of services of standardization and information. The completeness and effectiveness of the collection of standard technical documentation in many respects contribute to the successful performance of experimental design and scientific research work.

The changeover to the state acceptance of the output being produced is lending particular urgency to the question of the supply of enterprises with standard technical documentation. The establishment of the conformity of a product to the prevailing standard technical documentation is one of the basic tasks of state acceptance and enterprises.

The acquisition of a collection of standard technical documentation is carried out by various means. For example, in Sverdlovsk Oblast acquisition is carried out through Standards Store No 14 (Sverdlovsk), through enterprises which are the suppliers of materials and components, through main and base organizations for standardization, and others.

A large role in this matter is being assigned to the Sverdlovsk Intersectorial Territorial Center of Scientific and Technical Information and Propaganda (STsNTI), which is called upon to supply enterprises of the region with copies of standard technical documentation in accordance with their requests.

Let us turn to the experience of the work of this center. From 2 to 6 months, it turns out, are required to ascertain the presence of the requested documents in the collection of the STsNTI and to affix the stamp "Not found in the collection of the Sverdlovsk Center of Scientific and Technical Information and Propaganda."

There is also a similar picture if the document is available at the STsNTI. The time of the preparation of copies is the same—from 2 to 6 months. Here, as they say, they are not in the mood to speed up!

In order not to lose business contacts with its clients, since these operations are of a contractual nature and the STsNTI ascertains in advance the availability of assets in the current account of the requester, a letter of the following content was drawn up by them and duplicated in a run of 1,000 copies: "In connection with the large number of requests and the overloaded state of the copying and duplicating equipment, the center does not have the opportunity at present to fill the order of your enterprise in the normal time.

"If you have as before a need for these documents or several of them, please repeat your order to place the order in line."

It is a somewhat strange statement of the question: "If you have as before"?! Obviously, the management of the STsNTI is counting on the length of the period and on the fact that with time the need for standard technical documentation will disappear like last year's snow. It is also incomprehensible why it is impossible to immediately put the order in line and to report this to the author of the request. In case of the absence of the document at the STsNTI, why is it impossible to promptly request it at the All-Union Data Bank of Standards and Specifications? For enterprises want to receive some standard technical documentation or other not for the sake of idle

curiosity. In some cases they need information for an answer to a specific question, in others—for the choice of the most correct and economically advisable version, and so on.

Incidentally, about the standard time and responsibility of the STsNTI in this matter. All-Union State Standard 1.7-85 "The State System of Standardization. The Procedure of Supplying Standards and Specifications," in accordance with the requirements of which intersectorial territorial organs of scientific and technical information (republic institutes of scientific and technical information, scientific and technical information centers) carry out the supply of enterprises with copies of standard technical documents, was put into effect on 1 January 1987. This standard establishes as 1-month period of the filling of requests with respect to specifications.

Since the effect of state standards applies throughout the territory of the country, the Ural Center of Standardization and Metrology, apparently, must make a check of the introduction of All-Union State Standard 1.7-85 at the STsNTI and to draw the necessary conclusions. Given the universal changeover to full cost accounting the enterprise will probably demand a forfeit from the STsNTI for the failure to fulfill its contractual obligations.

As to Standards Store No 14, for the sake of fairness it should be said that it has changed the style of work for the better. In particular, a computer processes the order blanks, indices of special consideration have been awarded to subscribers, who have a large document turnover and long-standing relations with the store. These measures increased the efficiency and promptness in the supply of enterprises with state standards and guiding documents of the USSR State Committee for Standards.

However, I would like to make several comments, the resolution of which, in our opinion, would improve the work of the store. For example, the decision on the abolition of access of clients to the shelves with documents, that is, a form of customer self-service, seems mistaken to us. In ordinary trade this form is tending to expand.

Inadequate attention is being devoted to the filling of one-time requests for standard technical documentation by letters. If the requested standard technical documentation is available, they send it to the client, in the absence of such the letter even remains unanswered, although in All-Union State Standard 1.7-85 there is the clear instruction that standards stores are obliged to send the request for the lacking standard technical documentation to the Central Office for the Dissemination of Standards (Moscow) for the obtaining of a copy.

In other words, in any situation the request of subscribers on their supply with the necessary standard technical documentation should be filled and in the shortest time.

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Questions, Answers on Standardization

18140049e Moscow STANDARTY I KACHESTVO in Russian No 9, 1987 pp 88-89

[Article under the rubric "Specialists Answer You": "The System of the Development and Delivery of Products to Production in Questions and Answers"]

[Text] [Question] In conformity with All-Union State Standard 1.0-85 the registration and storage of specifications and the making of changes in them are carried out in accordance with the standards of the Unified System of Design Documentation, that is, by the department of technical documentation (OTD) or the bureau of technical documentation (BTD).

Where should the originals of specifications be stored, if these subdivisions are not envisaged by the structure of the enterprise?

[Answer] In the absence at an enterprise of a department of technical documentation or a bureau of technical documentation any subdivision of the enterprise (for example, the department of standardization) can carry out the registration and storage of specifications and the making of changes in them, if these functions have been assigned to it by the management of this enterprise.

[Question] What is the procedure of the storage of specifications for materials and substances, which are being developed and produced in accordance with documentation that is not envisaged by the Unified System of Design Documentation?

[Answer] In case of the production of some materials and substances or others by several enterprises in accordance with the same specifications the developer of the product (as a rule, the base organization for standardization), who is responsible for the scientific and technical level and the updating (modernization) of this product, is the holder of the originals of these specifications.

[Question] If the specifications for a product were approved in some republic, is it possible to use them when placing this product into production in another republic or is it necessary to draw up for it its own specifications?

[Answer] The requirement that in case of the placement into production of a product, which was previously assimilated at another enterprise, it is not permitted to draw up and approve once again the specifications, is established in All-Union State Standard 1.3-85, Paragraph 2.4.

However, in case of the assimilation of the production of a product at enterprises of some union republic when there are specifications, which have been approved by union republic and republic ministries (departments), their enterprises, and public and cooperative organizations of another union republic, the use of such specifications is allowed on permission of the state planning committee of the union republic, the enterprise of which will assimilate this product.

[Question] A territorial organ of the USSR State Committee for Standards refuses the registration of the specifications for a series-produced product, which have been agreed upon by all the interested organizations and have been approved in accordance with established procedure. The reason for the refusal is the lack of a certificate of acceptance of the prototype (test batch).

Is the requirement of the organ of the USSR State Committee for Standards legitimate, if in All-Union State Standard 1.3-85 the getting of agreement on specifications without an acceptance commission is envisaged?

[Answer] All-Union State Standard 1.3-85 should not be understood in such a way that at the discretion of the developer it is possible to get agreement on the specifications both in accordance with Paragraph 1.1 in the acceptance commission and in accordance with Paragraph 1.2 by simultaneous sending to the agreeing organizations.

In conformity with the requirements of the standard the specifications should be submitted for approval to the acceptance commission in accordance with the procedure established by Paragraph 1.1 of the standard.

However, there is a product, the placement of which into production is carried out without the organization of an acceptance commission. In this case the specifications are submitted for approval in accordance with Paragraph 1.2. As an example it is possible to cite a product, the production of which will be carried out in accordance with working documents which were acquired in accordance with licenses of foreign firms.

[Question] Should the programs and methods of product tests be submitted for approval to state acceptance?

[Answer] In conformity with All-Union State Standard 26964-86 state acceptance is carried out for the purpose of evaluating the conformity of the product being checked to the standards and specifications, the reference models, planning, design, and technological documentation, and others. Consequently, it is not necessary to submit for approval to state acceptance the technical documentation, including the programs and methods of tests (PM), which is completed at the stage of the development of a product.

The programs and methods, for example, of standard tests, which were drawn up in the process of producing the product, as well as the changes to prevailing programs and methods are submitted for approval to state acceptance.

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UDC 631.3-229:658.58:001.4

Concepts of Repair, Reconditioning of Parts Defined

18140049d Moscow STANDARTY I KACHESTVO in Russian No 9, 1987 pp 63-67

[Article by Candidate of Technical Sciences S.L. Averbukh, the VNIIVID of the Remdetal All-Union Scientific Production Association, under the rubric "Questions of Terminology": "On the Concepts of the 'Repair' and 'Reconditioning' of Parts (For Purposes of Discussion)"; first three paragraphs are *Standarty i Kachestvo* introduction]

[Text] From the editorial board. In the article of S.L. Averbukh, "On the Concepts of the 'Repair' and 'Reconditioning' of Parts," which is offered to the attention of readers, the interpretation of these concepts in various standard technical documentation and literature is analyzed.

The assertion of the author that thus far there is no clear differentiation between these two concepts is entirely correct, and they are both being used extensively in industrial practice.

The editorial board believes that the discussion of this question on the pages of the journal will be very useful. We await your reactions, opinions, and judgments on the offered theme.

A large number of various agricultural machines are repaired annually. In the process of repair individual parts of these machines undergo various kinds of treatment (machining, heat treatment, surfacing, and so forth) for the purpose of restoring the lost geometrical shape and physical properties. For some parts the treatment can be relatively simple (straightening, the running of a thread, and so forth), for others this is a set made up of interconnected technological and transportation operations. It is customary to divide the parts of machines, which have undergone technological action, into repaired and reconditioned parts.

Reconditioned parts are taken into account separately, since this is a planning indicator. It is entered in the industrial and financial plan and is summed up in the volume of gross output.

There is a monthly and quarterly report on the indicator "the reconditioning of parts." The monthly, mailed report was established by Letter B No 192-8-3-91 of the USSR State Committee for the Supply of Production Equipment of Agriculture of 24 October 1979. Special form 3 SKhT, which was approved by the USSR Central Statistical Administration, is used for the monthly report, in it there are 107 lines with a specific list of parts of a range that is taken strictly into account.

Moreover, departments and administrations of the reconditioning of parts of all levels gather as needed rapid information on the fulfillment of various orders, in which additional assignments on the repair of assembly units and the reconditioning of parts are given to enterprises.

As the survey of a number of repair enterprises of the RSFSR and the Ukrainian SSR showed, the people, who prepare primary information on the reconditioning of parts, do not have a clear idea of which parts to assign to reconditioned parts and which parts to assign to repaired parts. The available explanations on this question are ambiguous and vague. As a result, the information turns out to be subjective information, which does not reflect the real state of affairs, and entails a number of problems.

For example, according to the data of [1] the volume of the reconditioning of parts comes to about 500 million rubles a year, while the economic impact comes to 170 million rubles. According to the data of [2] the volume of the repair of parts at workshops of the rayon unit comes to 350 million rubles, the economic impact comes to more than 200 million rubles. Against the background of the total consumption of spare parts (about 2 billion rubles a year) such impressive volumes of the reconditioning and repair of parts are not sensed, the shortage of spare parts is not decreasing. The cost of the repair of machines is also not decreasing, but is increasing.

It should be noted that the absolute indicator of the reconditioning of parts in volume and with respect to the products list does not yield practically useful information and cannot serve as an evaluation criterion. It is possible to recondition a large number of such parts, of which there is an abundance at trade bases, and not to recondition those which agriculture urgently needs; to recondition with expenditures, which far exceed the labor intensity and cost of the production of new parts, with a quality which is obviously unacceptable from any point of view.

Another example is that during the period from 1962 to 1983 the volume of the reconditioning of parts increased from 17.6 million rubles to 486 million rubles, that is, by twenty-sevenfold. Its increase comes to 10-20 percent a year. Such unnatural dynamics of the increase of the production volumes has a subjective origin and is connected to a significant extent with terminological ambiguity. It is possible to qualify any technological action on a part in the process of the repair of a machine as reconditioning and to report back accordingly.

The problems being analyzed also affected scientific research institutions. For example, the State All-Union Scientific Research Technological Institute of the Repair and Operation of the Machine Tractor Fleet drew up and published recommendations on the repair of parts at the workshops of rayon agroindustrial associations [2]. The VNIIVID published recommendations with a similar title and of nearly the same size [3], the State All-Union Scientific Research Technological Institute of the Repair and Operation of the Machine Tractor Fleet at the Maloyaroslavets Affiliate is conducting research on the repair of parts, although a special all-union institute has been established in the country for these purposes.

The article of specialists of the Maloyaroslavets Affiliate of the State All-Union Scientific Research Technological Institute of the Repair and Operation of the Machine Tractor Fleet and the central special design and technological bureau, "The Choice of the Means of Repair of Parts by the Method of Expert Evaluation," was published in the journal *Mekhanizatsiya i Elektrifikatsiya Selskogo Khozyaystva* (No 3, 1984). The study was done on the basis of the example of the reconditioning of a track link, but in the article the authors did not mention once the term "reconditioning."

The developed stand for the positioning and straightening of frames at the State All-Union Scientific Research Technological Institute of the Repair and Operation of the Machine Tractor Fleet is called "A Stand for the Repair of Frames," at the VNIIVID a similar stand is called "A Stand for the Reconditioning of Frames," the State All-Union Scientific Research Technological Institute of the Repair and Operation of the Machine Tractor Fleet published "Katalog potochno-mekhanizirovannykh liniy dlya remonta uzlov i detaley" [A Catalog of Mechanized Flow Lines for the Repair of Assemblies and Parts] (1982), the VNIIVID published "Katalog potochno-mekhanizirovannykh liniy dlya vosstanovleniya detaley" [A Catalog of Mechanized Flow Lines for the Reconditioning of Parts] (1983).

In order to obtain an expert evaluation of the understanding of the terms "repair" and "reconditioning" of parts, four examples of technological action on a worn out part were prepared at the VNIIVID:

1) a crack was discovered in a cylinder block. With respect to all the other parameters within the tolerances it is "serviceable." The defect was eliminated by welding up the crack;

(1) Порядковый номер примера	(2) Результаты экспертного опроса сотрудников*										(3) Соотношение принятых терминов, %	
	I	II	III	IV	V	VI	VII	VIII	IX	X	(4) «восстановление»	(5) «ремонт»
1	1	0	1	0	1	1	0	1	1	0	60	40
2	1	0	1	0	0	1	0	1	1	0	50	50
3	1	1	1	1	1	1	1	1	1	1	100	—
4	1	0	0	0	1	0	0	1	1	0	40	60

(6) *В таблице приняты следующие условные обозначения: 1 — «восстановление»; 0 — «ремонт».

2) the weakening of several rivets was discovered in the frame of a tractor. With respect to all the other parameters the frame is sound. The defect was eliminated by installing new rivets;

3) on a shaft the mounting seat for the bearing was worn out. The other parameters within the limits of tolerance are "serviceable." The defect was eliminated by surfacing with subsequent grinding to nominal size;

4) the gears of a pump (NSh) were reground to the new repair size for a reduced casing.

These examples were presented to 10 associates of the institute, who are involved in the development of technological processes and repair drawings. They were to specify in which case the term "reconditioning" should be used, and in which case the term "repair" should be used. The results of the survey are cited in the table.

The results of the expert survey testify that among representatives of science the understanding of the studied terms is also far from unambiguous. "A true sign of the satisfactory or unsatisfactory state of science is the satisfactoriness or unsatisfactoriness of the terminology," N.G. Chernyshevskiy wrote [4].

A methodological approach to the analysis of concepts is given in the work of V.I. Lenin "Nauka logiki" [The Science of Logic], in which there is the section "On the Concept in General": "Human concepts are not fixed, but are always moving, merge into each other, run into each other, without this they do not reflect real life. The analysis of concepts, their study...always requires the study of the movement of concepts, their connection, their interchanges."[1]

Let us examine from this standpoint the evolution of the studied concepts, which is connected with changes of the productive forces of society and the development of scientific and technical progress. The management of concepts is accomplished as needed by their clear regulation in state and sectorial standards, guiding technical materials, and other official documents, in which they acquire the meaning of a term.

The increased interest in the essence of the concepts of the "repair" and "reconditioning" of parts dates to the period of 1978-1983, that is, to the period of particular attention to the economical consumption of various resources. During those years the Administration for the Reconditioning of Parts and the corresponding local services and the Remdetal All-Union Scientific Production Association with a scientific research institute were established in the State Committee for the Supply of Production Equipment for Agriculture. During this period a sharp jump in the volumes and the range of reconditioning of worn out parts is noted.

The epistemology of the concept "repair" as applied to mechanized production was given for the first time by K. Marx in "Kapital" (1862). In the subsection "The Components, Replacement, Repair, and Accumulation of Fixed Capital" it is stated: "To repair means to restore.... Repair operations are necessary in order to support the existence of a machine to the expiration of its average life span."[2] In "Bolshaya sovetskaya entsiklopediya" [The Great Soviet Encyclopedia] (1955) the concept "repair" is explained as follows: "Repair (to fix) is the correction of damages, failures, the elimination of defects, the fixing of something, for example, the repair of a building, machine tool, tractor."

The analysis of the essence of the term "reconditioning" showed that its conceptual meaning is "to put in the formal normal state" (S.I. Ozhegov), for example, "restoration of rights," "restoration of health." Then this concept became widespread in chemistry—"reduction reaction" and in rail transport—"wrecking train."

The terms "repair" pertains not to parts, it is stated in [5], but to mechanisms, assemblies, and units, since mainly disassembly and assembly operations are encompassed by this term.

The reconditioning of parts, it is indicated in work [6], is a set of technological operations on worn out or damaged parts, which ensures full interchangeability with similar

new items and a service life that is not shorter than the service life of a new item, and "the failure to fulfill if only one of the indicated conditions transfers a part to the category of repaired parts."

The term "repair" in the broad sense has been standardized and is defined as follows: "Repair is a set of operations on the restoration of a defect or the working capacity of items and the restoration of the service lives of items and their components" [7].

In document [8] a definition is given to the term "restorability," by which "the properties of parts and assembly units that have worked the established service life, which find expression in the possibility of giving them the nominal or repair sizes and other initial quality indicators or indicators close to them, are understood."

The definition of the concept of the "reconditioning" of parts, which is given in work [9], is formulated as follows: "The reconditioning of a part is a set of operations on the elimination of its basic defects, which ensures the renewal of the working capacity and parameters, which have been established in standard technical documentation."

In [10] it is stated: "The reconditioning of parts is a set of technological operations, which ensure the change of the geometrical characteristics and parameters to the level of an analogous new part and of the physical parameters to a level that is close to the new part.... The repair of a worn out part is a set of technological operations, which ensure the change of the physical and geometrical characteristics and parameters to a level that meets the requirements of the standard technical documentation for a repaired part."

In work [11] the following definitions are given: "The reconditioning of parts: the life of a part is restored at no lower than the level of new parts.... Repair: the serviceability and (or) working capacity of a part is restored in conformity with the prevailing standard technical documentation."

Let us analyze the content of the cited definitions. First it is necessary to note that the concept "repair" in the past was applied only to complex objects: a building, a locomotive, a tractor...and only recently was carried over to elementary object-parts. Here it was used as a synonym of the word "reconditioning." In the spoken language and in the periodic press these words now replace each other. The word "reconditioning" as applied to the parts of machines acquired prevalence at the beginning of this century and has retained it at present.

The definitions of [5, 10] set as indispensable the condition to regard as reconditioned only those parts, which in all parameters conform to new parts. Prior to 1981 on all the repair drawings, in accordance with which parts were reconditioned, there was the mandatory note: "The life of the reconditioned part should come to not less than 100 percent of the life of a new part." With the introduction of Guiding Technical Materials 70.001.053-81 [12] this note was eliminated. In the named guiding technical materials it is stated: "Repair drawings are developed for items (parts, assembly units) of agricultural equipment, the reconditioning or repair of which is technically possible and economically advisable.... The life of a reconditioned part should be not less than the indicator, which has been established in standards or specifications."

If we scrutinize the logic of the definition of [10], it is easy to be convinced that the word "close" in the expression "close to a new part" is indefinite. A specific standard document is necessary for its determination. If there is a deviation from the parameters of a new part, this is repair, no matter how small this deviation seems.

In the other definitions it is possible to regard as reconditioned the parts, the parameters of which satisfy the requirements of the standard technical documentation, their qualitative indicators can be close to the analogous indicators of new parts.

The repair of a part in all the definitions is limited to the restoration of the working capacity of a part within the limits established by the standard technical documentation.

In the explanations to the terms in All-Union State Standard 27.002-83 [13] the concepts of the "restoration" of a serviceable state and the "repair" of parts are differentiated in the following manner: "The transfer of an object from an unserviceable state to a serviceable state is accomplished by means of operations of reconditioning or repair. The operations of the identification of the failure, replacement, the regulation and checking of the technical state of the elements of the object, and the final operations of the checking of the working capacity of the object as a whole are for the most part grouped with the former.

"The transfer of an object from a marginal state to a serviceable state is accomplished by means of repair, in case of which the restoration of the life of the object as a whole occurs." Here for the term "repair" a reference to [7], in which reconditioning is the key word to the definition of the term "repair," is given. It is an obvious vicious circle and a violation of the requirements of the methods [14].

The made analysis revealed the following regularity: in [6 and 11] a reconditioned part in all parameters should be like a new part; in [8]—close to a new part; in [9] it should satisfy the requirements of the standard technical documentation; in [10] the geometry of the part should be like that of a new part, while the physical properties should be close to a new part, here a part, which satisfies the requirements of the standard technical documentation, is considered repaired; the same assertion is present

in [11]. It should be taken into account that nearly all the analyzed definitions are directive. Even the definition of [9], which is taken from a book, is recommended as an official definition and is formulated as follows: "The set of technological operations on the elimination of defects of a part (a nondetachable assembly unit), which ensures the restoration of its working capacity and geometric parameters, which are established by the standard technical documentation" [15].

Back in 1857 N.G. Chernyshevskiy stated the basic demands on the use of terms: 1) always use the clearest and unambiguous terms; 2) never use words that have two meanings, without having specified in which of them it is being used; 3) never use one word in two meanings; 4) never use different words in the same meaning. Thus it has turned out that the use of the concepts of the "repair" and "reconditioning" of parts is taking place in violation of these rules.

Conclusion. As was shown in the work, uncertainty exists in the understanding and use of the terms of the "repair" and "reconditioning" of parts, which is the cause of a number of serious problems. The formed uncertainty has a subjective origin and is connected with the change of the orientation in the criteria of the activity of works on the reconditioning of parts.

As a way out of the situation, until the analyzed terms receive strictly regulated official definitions, I will venture to suggest the following differentiation of the concepts:

—it is necessary to give to the concept of the "reconditioning" of parts its initial meaning—"the restoration of lost properties." The extent of the restoration of lost properties is specified by the standard technical documentation and depends on the technological and technical possibilities of the sector;

—the term "repair" should be applied to machines, assemblies, assembly units, and the processes, which are connected with their disassembly, assembly, adjustment, painting..... Such an approach in general corresponds to the definition of [9], but its delimiting effect and subsequent determination in practice can be realized on the condition of the change of the criteria of the activity of works on the reconditioning of parts;

—instead of the existing gross indicators of the number and value of reconditioned parts, which can remain statistical indicators, the following ones are proposed: the indicator of the decrease of the shortage of spare parts by meeting the need with reconditioned parts; the extent of the supplanting of new spare parts with reconditioned ones and the decrease of the expenditures on the repair of machines in accordance with the item "spare parts," given the established indicators of the quality of repair.

The introduction of the named criteria and the uniform use of the concepts "the repair of machines" and "the reconditioning of parts" will serve as a stimulus for the change of the orientation around the second life of parts—the changeover to intensive methods of development of the sector.

Footnotes

1. V.I. Lenin, "Poln. sobr. soch." [Complete Works], Vol 29, p 227.

2. K. Marx, "Kapital," Vol II, p 171.

Bibliography

1. Chernoivanov, V.I., "Advanced Technologies Into Production," *Tekhnika v Selskom Khozyaystve*, No 4, 1983, pp 44-46.

2. "Rekomendatsii po organizatsii remonta detaley traktorov, avtomobiley, kombaynov i selskokhozyaystvennykh mashin v masterskikh rayonnykh agropromyshlennykh obyedineniy" [Recommendations on the Organization of the Repair of Parts of Tractors, Motor Vehicles, Combines, and Agricultural Machinery at the Workshops of Rayon Agroindustrial Associations], Moscow, GOSNITI, 1983, 77 pages.

3. "Rekomendatsii po organizatsii uchastkov vosstanovleniya iznoshennykh detaley mashin v masterskikh mezhkhozyaystvennykh obyedineniy po mekhanizatsii i elektrifikatsii selskogo khozyaystva" [Recommendations on the Organization of Sections of the Reconditioning of Worn Out Parts of Machines at the Workshops of Interfarm Associations for the Mechanization and Electrification of Agriculture], Moscow, Goskomselkhoztekhnika SSSR, 1983, 73 pages.

4. Chernyshevskiy, N.G., "Essays on Political Economy," "Poln. sobr. soch." [Complete Works], Vol IX, 787 pages.

5. Kazartsev, V.I., "Remont mashin" [The Repair of Machines], Moscow, Selkhozizdat, 1961, p 180.

6. Chernoivanov, V.I., Kalinichesko, V.M., and Malygin, V.G., "The Principles of the Technological Preparation of the Performance of the Reconditioning of Parts," *Trudy GOSNITI*, Vol 57, 1978, p 16.

7. All-Union State Standard 18322-78. The System of the Maintenance and Repair of Equipment. Terms and Definitions.

8. All-Union State Standard 23660-79. The System of the Maintenance and Repair of Equipment. The Assurance of Maintainability in Case of the Development of Items.

9. Chernoivanov, V.I., and Andreyev, V.P., "Vosstanovleniye detaley selskokhozyaystvennykh mashin" [The Reconditioning of Parts of Agricultural Machinery], Moscow, Kolos, 1982, 287 pages.

10. "Yedinaya terminologiya v oblasti tekhnicheskogo obsluzhivaniya i remonta selskokhozyaystvennoy tekhniki dlya stran-chlenov SEV" [Uniform Terminology in the Area of the Maintenance and Repair of Agricultural Equipment for the CEMA Member Countries], Moscow, Otdel Upravleniya delami SEV, 1980, p 24.

11. "Ukazaniya po remontu detaley selskokhozyaystvennoy tekhniki v masterskikh khozyaystv i rayselkhoztekhniki" [Instructions on the Repair of Parts of Agricultural Equipment in the Workshops of Farms and Rayon Agricultural Equipment Associations], edited by S.S. Cherepanov, Moscow, GOSNITI, 1983, 130 pages.

12. "RTM 70.0001.053-81. Chertezhi remontnyye. Poryadok razrabotki, soglasovaniya, utverzheniya i registratsii" [Guiding Technical Materials 70.0001.053-81. Repair Drawings. The Procedure of Drafting, Coordination, Approval, and Registration], Moscow, Goskomselkhoztekhnika SSSR, 1982, 15 pages.

13. All-Union State Standard 27.002-83. Reliability in Equipment. Terms and Definitions.

14. "RD 14-74. Metodika standartizatsii nauchno-tekhnicheskoy terminologii" [Working Document 14-74. Methods of the Standardization of Scientific and Technical Terminology], Moscow, Gosstandart SSSR, 1977, p 49.

15. "RTM 70.0009.038-85. Sistema tekhnicheskogo obsluzhivaniya i remonta tekhniki. Vosstanovleniye detaley. Terminy i opredeleniya" [Guiding Technical Materials 70.0009.038-85. The System of the Maintenance and Repair of Equipment. The Reconditioning of Parts. Terms and Definitions], Moscow, Agroprom SSSR, 1986, p 3.

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UDC 006.354.05:001.8

Drafting of Standards at Academic Institutions
18140049c Moscow STANDARTY I KACHESTVO in Russian No 9, 1987 pp 62-63

[Article by L.G. Ivashechkina, the Special Design and Technological Bureau with an experimental works of thermal physics instrument making of the Institute of Technical Thermal Physics of the Ukrainian SSR Academy of Sciences, under the rubric "The Experience of the Drafting and Introduction of Standards": "The State Standard Is the Result of Scientific Research Development"; first two paragraphs are *Standarty i Kachestvo* introduction]

[Text] From the editorial board. The formulation of state standards in accordance with the results of completed scientific research is one of the means of shortening the length of the "research-production" cycle.

The experience of performing such work and the difficulties, with which the academic scientific institutions that are the developers of state standards are faced, are told about in the article published below.

In conformity with All-Union State Standard 1.0-85 standards and specifications should be formulated on the basis of the highest achievements of domestic and foreign science, engineering, technology, and advanced know-how and envisage solutions that are optimal for the economic and social development of the country. Here, of course, it is necessary to use the unique information which academic scientific institutions and design and technological organizations obtain during the conducting of research and development.

The specific nature of the work of academic organizations consists in the large diversity of the conditions of the use of the results that were obtained during scientific work. These are new methods of research and analysis, new substances, materials, and drugs, new types of instruments and equipment, and new technologies. Moreover, the national economic efficiency of scientific research depends not only on the obtained results, but also on the time of their practical implementation. That is why the drawing up of the results of scientific research work in such a form, which would make it possible to reduce to a minimum the time of their introduction, that is, in the form of state standards, would be the optimum version for the national economy of the country.

Precisely in the shortening of the length of the "research-production" cycle (due to the duration of both research itself and its introduction) one should seek, first of all, sources of the efficiency of the use of the methods of standardization in the activity of academic institutions [1].

The natural aspiration of scientists to introduce more quickly at enterprises useful innovations, which were the consequence of successfully completed scientific research work, experimental design work, and experimental technological work, and to broaden as much as possible the area of their dissemination leads to the decision on the necessity of drafting a state standard.

At present more than 120 state standards have been drafted by scientists of the Ukrainian SSR Academy of Sciences in accordance with the results of completed scientific research work, experimental design work, and experimental technological work and are in effect. These are both organizational methods standards and standards for industrial products. About 30 sectorial standards and standard documents for guidance for the methods of strength and wear-resistance analysis and tests in machine building have also been formulated and are in effect.

At the same time, the decision on the formulation of a standard imposes on its developer great responsibility, since in accordance with the requirements, which are

established by All-Union State Standard 1.15-85 "The State System of Standards. The Procedure of the Checking, Revision, Change, and Repeal of Standards," an approved state standard is attached to the developer in order subsequently to ensure the conformity of the requirements of this standard to the present scientific and technical level.

More than 70 state standards are attached to the Ukrainian SSR Academy of Sciences, which entails a number of mandatory operations: systematic (not less often than once every 5 years) checks of prevailing standards, the making of the appropriate changes, the extension of the term of their effect, and so on, which creates certain difficulties for scientists, inasmuch as after the pilot industrial introduction of scientific research work, experimental design work, and experimental technological work the theme is not financed. For example, in 1965 scientists of the Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences developed cases made of refractory compounds for thermocouples. Starting in 1969 this type of product was assimilated and has been series produced by the Brovary Plant of Powder Metallurgy of the Ukrainian SSR Ministry of Ferrous Metallurgy in accordance with All-Union State Standard 13403-77 "Cases Made of Refractory Compounds for Thermocouples. Specifications." The scientists, who developed the state standard, have been working many years on other problems, with other institutions, while All-Union State Standard 13403-77 as before has been attached to the Ukrainian SSR Academy of Sciences with all the ensuing consequences.

The decision of the USSR State Committee for Standards of 27 May 1985 on the streamlining and optimization of the prevailing collection of standard technical documents, in which there was posed the question of converting state standards for industrial products into sectorial standards of the corresponding ministries, to which the enterprises that series produce the products are subordinate, inspires hope. In conformity with this decision the opportunity is appearing to turn over the state standards, which have been formulated by academic institutions, to the corresponding base organizations for standardization of the leading sectorial ministries.

Thus, at present the USSR Ministry of the Machine Tool and Tool Building Industry is already deciding independently the further fate of the state standards and specifications, which have been formulated by scientists of the Institute of Superhard Materials of the Ukrainian SSR Academy of Sciences for tools, which are series produced by subordinate enterprises.

Another problem also worries academic institutes.

In the prevailing standard and procedural documents of the USSR State Committee for Standards [2] there are no clear criteria of the choice of the corresponding objects of standardization. Because of this there are no criteria that make it possible to determine in which cases it is possible and even more advisable to draft state standards, and in which ones it is possible and even more advisable to draft other standard documents [3]. Without the settlement of the indicated questions it is impossible to plan the drafting of new organizational methods documents in accordance with the results of completed scientific research work, experimental design work, and experimental technological work and, hence, to streamline the collection of state standards.

Bibliography

1. Atlivanik, L.G., "Economic Aspects of the use of Methods of Standardization in Scientific Research," "Materialy Vsesoyuznogo seminara po problemam standartizatsii i metrologii" [Materials of the All-Union Seminar on Problems of Standardization and Metrology], Tashkent, 1986.

2. "Metodicheskiye ukazaniya po razrabotke sistem obshchetekhnicheskikh i organizatsionno-metodicheskikh standartov. RD 50-369—82" [Procedural Instructions on the Drafting of Sets of General Technical and Organizational Methods Standards. Working Document 50-369—82], Moscow, Izdatelstvo standartov, 1983.

3. Kurochkin, V.F., Krutov, B.V., Dolgopolov, V.V., and Samokrik, L.S., "The Principles of the Choice of Objects of Standardization for State Organizational Methods Standards," *Standarty i Kachestvo*, No 8, 1985.

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UDC 025.49:62-229

Sectorial Classification of Checking Operations

18140049b Moscow STANDARTY I KACHESTVO in Russian No 9, 1987 pp 59-61

[Article by V.N. Chupyrin, L.A. Sergeyeva, and V.S. Mirotvorskiy, the Gorkiy Affiliate of the All-Union Scientific Research Institute of the Normalization of Machine Building, under the rubric "Classifiers and the Unified System of Documentation": "The Sectorial Classification of the Operations of the Checking of the Geometrical Parameters of Parts"]

[Text] When formulating the sectorial classifier of operations of control "The Classifier of Technological Operations in Machine Building and Instrument Making"[1] was taken as the basis and the further detailing of the criteria of the classification of technical control [2-5] was carried out, that is, three criteria with respect to the versions, subversions, and place of location (external, internal, external-internal) of the dimensions being controlled were introduced.

In the sectorial classifier drawings, which illustrate each achievement of control and on which the further detailing of control operations by versions and the place of location of the parameters being controlled is traced, are given and the names, codes, and sketches with respect to individual control operations are cited.

For example, let us examine the achievements "The Control of a Plane Angle" and "The Control of Linear Dimensions."

Table 1

(1) Код	(2) Наименование операции			
0210	Контроль величин пространства и времени (3)			
0211	Контроль величин пространства и времени (3)			
0212				
0213				
0214				
0215				
0216		Плоского угла (4)		
0218		Длины (5)		
0220		Длины (5)	Контроль линейных размеров (6)	
0221			Контроль линейных размеров (6)	между плоскими поверхностями (7)
0222				между криволинейными поверхностями (8)
0223				между осями поверхностей (9)
0224				между координатами (10)
0225			(11) Контроль размеров криволинейных поверхностей	
0226			Контроль (12)	кривизны (13)
0227				диаметра (14)
0228				радиуса (15)
0230			Контроль расположения поверхности (16)	
0231			Контроль (12)	параллельности (17)
0232				перпендикулярности (18)
0233				наклона (19)
0235				соосности (концентричности) (20)
0236				симметричности (21)
0237				пересечения осей (22)
0238			(23)	позиционного расположения
0240			Контроль формы поверхности (24)	
....		(12)	Контроль	

Key:
1. Code
2. Name of operation
3. Control of values of space and time
4. Plane angle
5. Length
6. Control of linear dimenstions
7. Between plane surfaces
8. Between curvilinear surfaces
9. Between axes of surfaces
10. Between coordinates
11. Control of dimensions of curvilinear surfaces
12. Control
13. Curvature
14. Diameter
15. Radius
16. Control of location of surface
17. Parallelism
18. Perpendicularity
19. Slope
20. Coaxiality (concentricity)
21. Symmetry
22. Intersection of axes
23. Positional location
24. Control of form of surface

How these achievements look in the all-union classifier is depicted in Table 1.

For the achievement "The Control of a Plane Angle" subject to the version the following operations of the control of angles are additionally included in the classifier: between planes; a cone; the slope of a plane; between axes; between lines; the slope of an axis; between a plane and an axis.

Subject to the place of location the above-indicated control operations can be external and internal.

The achievement "The Control of Linear Dimensions" subject to the version is supplemented by operations of the control of linear dimensions between: plane surfaces; curvilinear surfaces; the axes of surfaces; coordinates; a plane and a curvilinear surface; a plane surface and an axis; a plane surface and a coordinate; two lines; a plane surface and a line; a curvilinear surface and an axis; a curvilinear surface and a coordinate; a curvilinear surface and a line; an axis and a coordinate; an axis and a line, as well as the control of the diameter and radius.

Subject to the subversion there are also grouped with the operations of the control of linear dimensions such ones as the control of the diameters with respect to a face, a groove, a cone, or a contoured surface, as well as the control of the convex and concave radii.

Linear dimensions can be external and internal.

The Code of the Technological Operation of Technical Control

Key:
1. The type of technological process in accordance with the method of fulfillment "Technical Control" in conformity with the Unionwide Classifier
2. The operation of control in conformity with the Unionwide Classifier
3. The version of the dimensions being controlled
4. The subversion of the dimensional being controlled
5. The place of location of the dimension being controlled
6. The range of measurements or the interval of lengths
7. The quality or the degree of accuracy
8. The name of the means of control
9. The category of the performer

The code of the technological operation of technical control is presented in the diagram.

There were also included in the code of the operations of technical control in addition to the criteria, which take into account the name of the dimension being controlled, such ones as the range of the measurements of dimensions or intervals of lengths; the qualities or degrees of accuracy; the name of the means of control; the category of the performer of the control.

The first two levels of the classification were taken in conformity with the Unionwide Classifier of Technological Operations. The third—the version of the dimensions being controlled—is introduced for the consideration of reserve operations (the number of symbols is indicated in the diagram). The fourth takes into account the subversion of the dimensions being controlled. The coding at this stage is accomplished by figures from 1 to 9. The fifth level takes into account the location of the dimension being controlled. The coding is achieved by numbers from 1 to 3 (for the external dimensions being controlled—1, internal—2, external-internal—3). The sixth is the range of measurements or the interval of lengths; the seventh is the quality or degree of accuracy; the eighth is the name of the means of control; the ninth is the category of the performer of the control.

The codes with respect to the criteria, which take into account the sixth-ninth levels of classification, are taken from coding tables. An example of such a table for the sixth level of classification is cited in Table 2, for the seventh level—Table 3, for the ninth level—Table 4.

Table 2

Ranges of linear dimensions, millimeters	Codes of ranges of linear dimensions
1-3	01
3-6	02
6-10	03
10-18	04
18-30	05
30-50	06
50-80	07
80-120	08
120-180	09
180-250	10
250-315	11
315-400	12
400-500	13

Table 2

Ranges of linear dimensions, millimeters	Codes of ranges of linear dimensions
500-630	14
630-800	15
800-1000	16

Table 3

Qualities	Codes of qualities of linear measurements
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17

Table 4

Category of performer of control	Code of performer of control
1	1
2	2
3	3
4	4
5	5
6	6

The codes for the eighth level of classification are taken from the list of means of control, which was presented in the sectorial classifier as a table.

In this classifier there is a section with tables on the choice of means of control. The degree of accuracy, the range of measurement, and the means of control for any dimension being controlled, which is present in the sectorial classifier, are indicated in them. Moreover, there are tables on the choice of standard means of control for operations of the measurement of: angles; external and internal linear dimensions by machine tool and superimposed means of measurement; radii, as well as the control of parallelism, perpendicularity, and slope; the coaxiality, symmetry, and intersection of axes; planeness and rectilinearity; cylindricalness, roundness, and the shape of longitudinal sections; the sagging of surfaces.

In this section it is specified which parameters are checked by special methods of control, the means of control of a thread, grooved parts, and roughness are listed.

The approach to the choice of the performer of the control also found reflection in the sectorial classifier. It is noted that when determining the category of work and the occupation of the performer of the control only staff controllers are considered. When designating the category of work there are taken into account: the type of the dimension being controlled; the name of the means of control; the accuracy of the dimension being controlled.

It is possible to use the classifier when analyzing the group of parameters being controlled in a section, on a line, and in a machining shop for the purpose of developing systems of technical control as a part of the organizational plans of production systems, and also as reference material when drawing up organizational charts of technical control by hand and in case of computer-aided design.

Bibliography

1. "Klassifikator tekhnologicheskikh operatsiy mashinostroyeniya i priborostroyeniya" [The Classifier of Technological Operations of Machine Building and Instrument Making], Moscow, Izdatelstvo standartov, 1987.

2. All-Union State Standard 24643-81 (CEMA Standard 636-77). The Basic Norms of Interchangeability. The Tolerances of the Form and Location of Surfaces. Numerical Values.

3. All-Union State Standard 24642-81 (CEMA Standard 301-76). The Basic Norms of Interchangeability. The Tolerances of the Form and Location of Surfaces. Basic Terms and Definitions.

4. Shubnikov, K.V., et al., "Unifitsirovannyye perenalazhivayemyye sredstva izmereniya" [Unified Adjustable Means of Measurement], Moscow, Mashinostroyeniye, 1978, 200 pages.

5. All-Union State Standard 89-9-81. The Basic Norms of Interchangeability. Normal Angles and Tolerances of Angles.

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UDC 006.01:006.354.05

Classification of Functions of Standards

18140049a Moscow STANDARTY I KACHESTVO in Russian No 9, 1987 pp 43-47

[Article by Candidate of Philosophical Sciences B.A. Urvantsev under the rubric "Returning to What Was Published": "The Functions of Standards (For Purposes of Discussion)"; first four paragraphs are *Standarty i Kachestvo* introduction]

[Text] From the editorial board. The discussion of the problems of the theory of standardization was begun by

the publication of the article of V.I. Shebanov "The Theoretical Scientific Concept of Standardization" (No 4 and No 5, 1986).

The editorial board has received a number of materials which were written in development of the theme that was raised by V.I. Shebanov. It is planned to discuss a large portion of the materials in the section "Scientific Methods Questions of Standardization" of the Scientific and Technical Council of the USSR State Committee for Standards.

Several articles, as well as the results of the discussion in the section will be published in the journal.

One of the received articles is published below.

The word "function" is a polysemantic concept. As applied to standardization we will regard it as an activity, an official role, a duty, a purpose. When analyzing the processes of standardization, that is, the stages of the drafting and introduction of standards, a number of its most important functions, which are not limited to the cited list, come to light.

The analysis of the available sources of information and the systematization of the functions of standardization make it possible to propose their following classification: 1. The reflection and accumulation of practical experience and scientific knowledge about the objects of regulation. 2. The synthesis of experience and knowledge and their reproduction (recording) in norms and concepts (standards). 3. The coordination (linking) of norms and concepts in standards. 4. The assurance of the continuity of experience and knowledge. 5. The overcoming of the constantly increasing complexity of human vital activity, the diversity of its objects, and the spontaneity of development. 6. The assurance of an overall saving. 7. The protection of the interests of the consumer and all of society. 8. The provision of society with officially sanctioned norms and concepts (standards, standards of weights and measures, prototypes), that is, standard information supply. 9. The assurance of the mutual understanding and contact of people. 10. The assurance of the interchangeability of the objects being regulated. 11. The organization of the objects of regulation. 12. The stabilization and control of the objects of regulation. 13. The assurance of social measure and monitoring. 14. The assurance of control.

This classification does not lay claim to perfection and completeness,although it completely and adequately reflects, so it seems to us, the practice of standardization.

Let us briefly examine each of the named functions. 1. The reflection and accumulation of practical experience and scientific knowledge about the objects of regulation take place mainly at the first stage of standardization. The gathering of information and the study of real objects are necessary, first of all, for the formulation of norms and concepts, which are intended, in the end, for the control of these objects and their further development and improvement. The drafting of standards presumes the analysis of the formed versions of the solution of similar problems, their critical evaluation, and the choice of the best, most economical ones of them.

However, this function is performed not only by standardization-activity, but also by standardization-science, which is based on the achievements of many natural science and social science disciplines and takes in the knowledge of the objective laws of the development of nature and society, which is necessary for the formation and development of the theory of regulation and the methodology of standardization. 2. When studying the objects of standardization not all experience and not all the information about them, but only that information, which is necessary for the regulation of the states and relations of the objects, is selected. The synthesis, recording, and reproduction of the selected information in norms and concepts are the second most important function of standardization. 3. The coordination (linking) of norms and concepts in standards, conceptions, principles, and methods of standardization is the continuation and the formalized embodiment of the results of synthesis. The laws of formal logic are the basis for this function. It is carried out primarily when drafting standards and in volume is less consuming than the preceding functions, but is psychologically more tense and crucial, for the quality of the standards being drafted and, in the end, their practical effectiveness depend on the quality of its fulfillment. 4. The assurance of the continuity of experience and knowledge is one of the essential functions of standardization. Continuity, as is known, affords the opportunity of the quick learning and use of the gained experience and knowledge by new generations of people. Accumulating, recording, and preserving in norms and concepts the production, scientific, ideological, economic, and other experience of people, standardization thereby promotes social development and progress.

Norms and concepts (standards) serve as a specific means (form) of the storing and transmission of various information. In them information is compressed, is condensed, and acquires such a form, which is most efficient and convenient for the purposes of communication, inheritance, and instruction. This function is closely interconnected and is interwoven with the other functions. 5. The function of standardization, which it is possible to formulate as the overcoming of the constantly increasing complexity of human vital activity, the diversity of its objects, and the spontaneity of development, expresses the activity of the subject in the implementation of the basic principle of standardization and its priority purpose and most important goal. It reduces mainly to simplification, limitation, clarification, the decrease of the risk of the occurrence of errors, and the deriving of benefit from the lessons of past experience. Therefore, typification and unification are the basic methods of the implementation of this function of standardization. 6. The assurance of an overall saving is

accomplished in the process of all activity on standardization and does not have pronounced stage-by-stage boundaries. By selecting advanced know-how and advanced knowledge and generalizing them, by simplifying social relations, by implementing optimum standards, and by formulating stereotypes of behavior and so forth, standardization thereby ensures an overall saving of manpower and material resources, time, and assets, which are necessary for the solution of constantly arising and recurrent problems. Subsequent generations use the results of the once performed work on standardization without significant expenditures and efforts. Thus, the primary expenditures on the drafting and introduction of standards in the process of their repeated use (repetition) are rewarded by a considerable socioeconomic impact. 7. The function of the protection of the interests of the consumer and all of society is of a legal nature, and some people call it a legal function, which secures the rights of consumers and producers and establishes the conditions of the delivery of a product, its acceptance, testing, and so forth, which are mandatory for fulfillment. But such an approach restricts the function.

The protection of the interests of the consumer is much broader, if we mean the consumption of not only items and products of social production, but also various services and products of nature and include here the protection of the health of the population and the environment, since in all these problems (spheres) society has specific interests and needs.

In all countries, especially the USSR, standardization performs quite actively and punctually the function of protecting the interests of the consumer. In our country entire sets of standards have been formulated and put into effect, a number of legislative acts on legal questions of standardization are in effect, and this problem is being elaborated quite intensively by lawyers. In practice, every standard, which is adopted in our country, is a legal act and is aimed at the protection of the interests of the Soviet consumer and all of society against the delivery of poor-quality items, against material and moral harm from poor services or their lack, against the spoiling of the environment, against the endangering of health, and so forth. 8. The provision of society with officially sanctioned norms and concepts (standards, standards of weights and measures, prototypes), that is, standard information supply, which is a specific function of standardization, is also characteristic of all the regulating activity of society. If there were no exchange of information in society and nature, science and practice would not be able to exist and develop at all.

Standard information supply is a basic part of information supply as a whole. Standard supply is accomplished in the process of regulating activity. Standardization, as one of the types of conscious regulation, supplies physical production, science, technology, and other spheres with standard documents (standards), prototypes of items, models of labor, and so on. This function today is so important that its disappearance, if it is possible to imagine such a thing, would lead to the halt of all production.

Standard information supply is the highest and most complex and diverse type of information. The enormous file of standard documents is its medium and storer.

Standard information is the highest type of information, since it originates on the basis of the aggregate of social practice and advanced scientific and technical achievements. It appears in a concise, precise conceptual or coded form, which makes it possible to condense its content as much as possible and to decrease redundancy.

Standard information supply is an indispensable condition of the orientation and organization of the behavior of the individual, social group, and society as a whole. Without it the mutual understanding and contact of people and the assurance of social measure, evaluation, and monitoring are impossible; the control of society is inconceivable. 9. The mutual understanding and contact of people take place with the aid of linguistic signs, social norms, various symbols, physical models, and so forth, which are developed in the process of the vital activity of society. In this function the role of the assurance of the mutual understanding and contact of people in science and technology, physical production, and other areas of the national economy is assigned to standardization. Thus, the Unified System of Design Documentation, which takes into account domestic experience and the achievements of many national and international systems, is a unique language of science and technology and of physical production, which is comprehensible to every scientist, engineer, foreman, and worker. If this language did not exist, incredible difficulties with the drawing up of technical documentation, with the output of a product, and so forth would arise.

Except for universal systems, in every field of practice and scientific discipline its own "language": categories, terms, symbols, and styles, originates and takes root, which ensures the mutual understanding and contact of workers of this field. This "language" forms historically and is developed and improved in the process of the professional contact of people and the performance by them of other general functions of regulation.

The standard training and education of man are the most important component of the function of the mutual understanding and contact of people. Here standardization pursues a basic goal—the getting of people accustomed to precision, order, the choice of optimum solutions, consideration for spiritual and physical assets, and the development of a sense of responsibility for the observance of the requirements of standards and other standard documents.

The importance of the function of the mutual understanding of people in the development of society is inestimable. If sufficiently effective means of mutual contact did not exist, it would not be possible to ascertain our needs, opinions, or ideas; there would be no opportunity to create in society a sociopolitical, economic, and material environment and to ensure normal working conditions and confidence in the safety of one's own existence. 10. It is possible to regard the interchangeability of the objects being regulated as a function, as a principle and goal of standardization.

In the sense of a goal, standardization strives to reproduce the regulated objects in full conformity with the prevailing norms, that is, stereotype norms that replace each other functionally and dimensionally.

In the sense of a principle, standardization in its activity is guided by an objective law—the specific reproduction of objects, which occurs both in nature and in society, that is, the specific series nature of the "space enterprise," without which everything living on earth would disappear.

Regarding the assurance of the interchangeability of the objects being regulated as a function of standardization, we have in mind its active orientation toward the achievement of a goal. In practice this function of standardization is realized by the choice of the corresponding parameters of the objects being regulated at the stage of the drafting of standards and the punctual observance of their requirements in case of the production and use (functioning) of the objects in the vital activity of society, as well as in the case of the cooperation of production, when the interchangeability of its items becomes the basic principle. 11. The function of the organization of the objects of regulation in the literature has been studied and described more completely than the others. Here the point of view of all authors is more or less common; the difference is merely that some researchers view this function broadly, others narrow it to the limits of just physical production, with which it is impossible to agree. Inasmuch as standardization encompasses all aspects of human activity, its organizational role also appears everywhere that regulation occurs and the establishment of common optimum means of the cultural and economic community of people is necessary.

In Marxist literature a specific subjective activity on the achievement and support of the orderliness of the object, the system, and social relations and processes is understood by the organizational function. In a certain sense this activity is the norm-organization of social relations, for it is based primarily on universally accepted norms and their sets—standards.

In practice the organizational function of standardization reduces to the organization and regulation of social production, its structure, and the types and assortment of items, to the assurance of the specialization and concentration of production, to the maintenance and monitoring of the quality of the output being produced, and to the planning and performance of other work on standardization and the management of the national economy. All this is a direct, immediate purpose of standardization.

Norms and concepts (standards) also perform their organizing role indirectly, through the physical environment being regulated and other objects. 12. Standardization with time can lessen and lose its organizing role, if it does not ensure stabilization and control, that is, does not maintain the stability of the objects of regulation.

The stabilization of the objects of regulation is not a one-time act. It begins at the stage of the development of norms and concepts and continues during the classification of the product, terms, definitions, characters, symbols, and so on. Moreover, at the level of their documentary confirmation (that is, in standards) it is not necessary to resort to the control of the object. The state of the objects and their relations, which has been fixed at the ideal level and has been systematized in standards, remains stable. The real object itself is dynamic and under the influence of various objective and subjective factors can deviate from the norm. Therefore, for the purpose of bringing its parameters in line with the requirements of standards, it needs adjustment. Adjustment (in spontaneously developing systems, self-adjustment) is objectively characteristic of and necessary for all objects and systems that are being regulated. 13. The function "the assurance of social measure and monitoring" has, as is evident from its name, a dual purpose.

First, standardization realizes the role of a social measure through the introduction and use of standards, which have the capacity for measurement, comparison, and evaluation. By the introduction and use of the corresponding norms and concepts standardization at its concluding stage achieves the consistency and orderliness of the vital activity of people and social relations in the necessary proportions, ratios, and scale. This is a direct process of the social measure.

Second, in obtaining the necessary information on the state of real objects and systems (feedback) by their monitoring and by recording it, standardization contrasts and compares the actual parameters of objects with the ideal, theoretical parameters and evaluates them. If the differences between the theoretical and practical parameters prove to be significant and to go beyond what is permitted by the norms, the need for the adjustment of the objects and their bringing in line with the requirements of the standards arises. 14. Many functions of standardization are at the same time also functions of control as an independent type of regulating activity. Without standardization social control today is inconceivable, since under the conditions of the most extensive formalization of physical production it is ineffective without it.

In the process of performing the function of the assurance of control standardization processes the information on the state of the object of control, takes it into account and records it in norms and concepts, and then supplies the object of control with the necessary standards. Since norms and concepts (standards) are the basic elements of social control, they lend it the nature of standard control and govern the content of its results, which coincide both for standardization and for control.

As is evident from the made analysis, the functions of standardization are very diverse and extensive. They are interconnected both with each other and with the functions of other types of social regulation, which encompasses the entire process of the vital activity of people.

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Coordination of Economic, S&T Policy of CEMA Countries

18140170 Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 10, Oct 87 pp 61-68

[Article by Candidate of Economic Sciences S. Silvestrov (Moscow) and Candidate of Economic Sciences O. Gavrilyuk: "Scientific and Technical Progress and the Improvement of the Economic Mechanisms of the CEMA Countries"]

[Text] The acceleration of socioeconomic development—that is how the strategic policy of the Communist Party of the Soviet Union was formulated in the decisions of the 27th congress and in its program documents.

The directives of the congresses, which were held in the European countries of the socialist community, also direct attention to the universal comprehensive intensification of economic development. Signs of the exhaustion of the factors of extensive development appeared back in the middle of the 1960's, and decisions on the carrying out of economic reforms, which are called upon to prepare the national economy for the intensive type of development, were adopted in the majority of European CEMA countries. This work took nearly 2 decades. It is more difficult, it turned out, to overcome the inertia of extensive development than was initially assumed. Owing to a number of objective and subjective circumstances, which operated during the implementation of economic policy during the past decade, the planned changeover was delayed.

One must not regard the more pointed statement of the problem of intensification in the documents of the fraternal parties and the concerted decisions of the Economic Summit Conference in 1984 and at the 40th, 41st, and 42d meetings of the CEMA sessions as the simple repetition of former decisions. The task is formulated in a qualitatively new way. It is not enough to achieve the priority intensification of economic growth, the intensification of all aspects of the socioeconomic life of society is necessary. Practically all measures on the improvement of social relations, the systems of the planning and management of the national economy, and the organization and stimulation of labor and on the use of effective forms of foreign economic activity and international cooperation should be subordinate to this task.

The differences in the magnitude of the economic, scientific, and technical potentials of the socialist countries and in the tasks, which face their national economy, are responsible for the existence of dissimilar economic mechanisms and, consequently, specific differences in the methods of the organization, management, planning, and financing of production. However, at present in each country the pursuit of the policy of intensification has been made dependent on the reorientation of the economic mechanisms toward the speeding up of the introduction of the achievements of scientific and technical progress and the implementation of an active social, structural, and foreign economic policy, which are based on the consideration of the degree of supply with material, manpower, and natural resources and the efficiency of their use in the international division of labor.

The peculiarities of scientific and technical progress, which determine the directions of the restructuring of the national and international mechanisms of management, find expression in the increasing dynamism of social and production processes, the acceleration of the rate of the updating of the range of products being produced, the intersectorial nature of innovations, and the shortening of the cycles of the replacement of fixed and working capital in various production spheres and the time of the passage by inventions through all stages up to introduction; the shortening of the long lag between expenditures on an innovation and its practical return; the overcoming of uncertainty in the obtaining of results and the "extravagance" of scientific and technical progress; the consideration of its long-term unforeseen economic and social consequences.

Scientific and technical progress, which is the motive force of intensification, is a not well-defined, multidimensional phenomenon. And it is necessary to depict it in all changes in order to develop economic mechanisms, which are equal to the requirements of the comprehensive intensification of socioeconomic life.

The present economic mechanisms cannot have long-term stability and should be open for improvement under the constantly changing conditions of the world economic and national economic situation under the influence of scientific and technical progress and the intensifying internationalization of economic life.

Measures, which are aimed at the development of economic mechanisms that satisfy the requirements of comprehensive intensification on the basis of scientific and technical progress, are being implemented in the European CEMA countries. The reforms being carried out are contributing to the gradual overcoming of those properties of them, which formed when the extensive type of development predominated and have now become barriers that are hard to surmount. It is possible to group with them the primarily sectorial nature of planning and management; departmentalism and bureaucracy; the limited day-to-day economic independence of the basic economic units; the poor combination of the sectorial and territorial principles of management; the accomplishment of current tasks to the detriment of long-term tasks; the low interest of enterprises and labor collectives, individual workers and management personnel in the introduction of innovations; the limited time horizon of national economic planning (primarily annual or 5-year planning with an average 8- to 10-year cycle of scientific and technical progress), the planning, mainly, of evolutionary scientific and technical progress; the predominance of balance-sheet methods of planning in accordance with the achieved level; the slow switching

over of social consciousness and thinking to dynamic socioeconomic development; the inadequately active use of social factors of the intensification of economic growth.

For the purpose of overcoming these negative phenomena a set of measures, which are aimed at the improvement of the economic mechanism and management at all levels of the structural hierarchy—the national economic, sectorial, and regional levels and the level of the economic unit (enterprise)—is being implemented in a number of countries of the socialist community. A distinctive feature of these measures is the fact that they are linked most closely with the consideration of scientific and technical progress.

The common features of the steps being implemented in this sphere are: a goal orientation toward scientific and technical progress as the basic material factor of economic growth and the linking of its development with national economic plans; the clear distinction of the priority directions of scientific and technical progress; the combination of the unified technical policy within the state with the broadening of the role and powers of individual economic links (units) in the implementation of this policy and when accomplishing the special-purpose tasks of scientific and technical progress; the broadening of the time horizon of planning, the combination of long-range and current planning; the increase of the use of the goal program method, its extension to all the structural levels of the introduction of scientific and technical progress; the use of comprehensive goal programs of research and development and the introduction of their results in production; the activation of cost accounting levers and methods in the sphere of scientific production activity, including by the comparison of the expenditures and the results and the improvement of stimulation through various funds; the strengthening of the interconnection between the fund of the remuneration of labor and the material stimulation fund (the establishment of the dependence of the wage fund on the gross revenue or profit, which was derived by the introduction of innovations); the improvement of the system of pricing (both the general system of pricing and the system of pricing of new and improved products); the increase of the demands on the scientific and technical level and quality of the output being produced; the shortening of the time of the assimilation of new equipment.

At the present stage of socioeconomic development it is necessary to select such a direction of scientific and technical progress, which will ensure comprehensive intensification. Two basic interacting directions of scientific and technical progress are distinguished: the evolutionary direction—the improvement of existing items and the material and technical base, and the revolutionary direction—the cardinal transformation of production. However, in practice their manifestations are significantly more complex. For example, an "imaginary innovation," which improves the parameters of local production while its level in the world or even in the country has been surpassed, can be introduced in production. Such innovations preserve in concealed form the extensive means of development and disperse the scientific and technical potential. Another type is partial innovations, which reduce the expenditures on the items being produced. The transitional type of progress, which makes it possible to change over to new generations of items, completely changes the parameters of the items, which at the same time are produced on the basis of old technological concepts and principles. It is possible to change over to comprehensive intensification as a type of socioeconomic development only on the basis of revolutionary scientific and technical progress, as a result of which not only the generations of items, but also technologies and entire technological concepts and principles change. The changes in the production system are based on the influx of fundamentally new equipment and technologies and the introduction of a system of machines. The use of new technologies, which lose their unique, specialized nature and break the framework of individual sectors, is a condition of the mastering of such a type of technical progress. In them similar scientific and technical solutions are repeated, they become more flexibly adaptable to changes and yield an impact more rapidly in interconnected sectors and spheres of human activity. Therefore, one of the main tasks of the increase of the efficiency of social production, General Secretary of the CPSU Central Committee M.S. Gorbachev noted in a speech at a meeting of Czechoslovak-Soviet friendship in April of 1987, is "to attain in the shortest period the most advanced level in the key spheres of scientific and technical progress—information science and computer technology, the electronization and robotization of the national economy, the use of rotary and rotary conveyor lines, biotechnology, and a number of others."

The "microelectronics revolution," which began during the first half of the 1970's, serves as an example of the "explosive," revolutionary nature of scientific and technical progress. Many specialists regard this time as the start of the scientific production, or second industrial revolution. Microelectronics is shattering literally before our eyes all traditional notions about human possibilities in production and management, information science and daily life, the spiritual sphere.

The increasing demands on the technical level of items (technological feasibility, the modular nature of design, standard input and output parameters) can be met only on the basis of the replacement of manual methods of production by automated methods with the use of electronic computer hardware. The scientific and technical revolution is responsible for the changeover to qualitatively new technological systems, at the basis of which is the use of computers, robots, and flexible production systems, which make it possible to automate practically all technological processes. The most important feature of such development consists in the fact that the complication of electronic technology is accompanied by the simultaneous decrease of its market cost. Since the early

1970's the price of a microprocessor on world markets has declined from $350-400 to $3-4.[1] The latest base technology for the development of fundamentally new equipment has become widely accessible. As a result the microelectronics industry in developed countries of the world began to develop at an unprecedented pace. For example, in the United States the output of its products has increased by a factor of 20,000.[2]

Microelectronics is one of the priorities of scientific and technical progress, which has been incorporated in the basis of comprehensive intensification. In the CEMA countries and developed capitalist countries considerable assets are being concentrated in the development of a higher potential in the field of electronics, since it is believed that this potential has a good effect on the pace of economic growth. Indeed, new technologies can be more ecological and efficient and can ensure resource conservation, can increase the continuity of production and management processes, thereby shortening the time that capital is in reserves and circulation, and so on. However, for all the advantages of new technologies there are no grounds to give in to "technological euphoria" and to believe that the successes of intensification depend exclusively on the establishment of high technology sectors on the basis of leading technologies like microprocessors, biotechnologies, or biotronics, and so on. Academician L.N. Koshkin, one of the leading Soviet scientists in the field of machine building, believes that the prospects, which the introduction of new systems of machines and technologies is affording, may prove to be much more modest than predicted. Thus, according to some calculations, for the freeing of one person by means of flexible production systems it is necessary to spend about 60,000 rubles. "This means that not less than 20 years will be required for the recovery of the expenditures, which economically is unacceptable." Therefore, the anticipated freeing of 600,000 people is more than problematic. Moreover, L. Koshkin notes, since the great expenditures of labor on the maintenance of the additional amount of mechanisms and control systems were not taken into account in the calculations, a real danger of never returning the expenditures on the implementation of these plans exists.[3] In our opinion, these sectors in themselves will not ensure the acceleration of socioeconomic development. The restructuring of the reproduction, organizational, and management structures, the system of international cooperation of the CEMA countries, and all economic thinking is necessary. Moreover, the development of new scientific and technical directions and works should be accompanied by the modernization and retooling of the operating material and technical base of industry, without precluding here the elimination of individual completely obsolete and, therefore, unprofitable works.

The two basic directions of scientific and technical progress are closely interwoven and interact. But the first (the evolutionary direction) can be regarded rather as a stage, a prerequisite of the second, which is basic for the comprehensive type of intensification. The problem is that the skipping over of it can lead to technological overlapping and the existence of many structures in production and to the technological incompatibility of equipment, which, in the end, will decrease the effectiveness of the introduction of the most promising innovations. Experienced workers and scientists are worried by such a state of affairs with the use of the achievements of science and technology. For example, specialists of the GDR, when analyzing the effectiveness of the use of robotics in industry, singled out from the entire set of factors the two most essential ones: the creation of the technological unity of robotics and production, in which it is included, and the degree of use of highly productive equipment. The practical analysis of the use of robots in GDR machine tool building shows that it is possible to increase the time of their use by 20-30 percent.[4]

In the USSR the annual available time of operation, for example, of machining centers during two shifts comes to 28 percent, while within a flexible production system they are busy already 49 percent. But how are flexible automated production systems themselves—the height of integrated automation—being used? According to several estimates, the flexible automated production systems, which are now being introduced, will operate with a load of not more than 10-12 percent. In this way old inefficient works are being renovated by means of leading technologies.

The optimum combination of the two directions of scientific and technical progress by means of the economic mechanism during the transition period to comprehensive intensification for the present remains a problem, which is still not completely solved on either the theoretical or the practical level. First of all it remains unclear how to incorporate revolutionary technologies in the process of planning and how to organize the system of the material stimulation of production collectives and the financial regulation of the innovative activity of enterprises in order to subordinate their interests to the interest of all of society in comprehensive intensification.

The novelty of the processes, which are occurring in the economy and production, determines the basic nature of the solutions of this problem in the CEMA countries. For example, the experience of socialist rationalization in the GDR is interesting. The spending on the production of means of rationalization at combines of the GDR comes to about 20 percent of all industrial capital investments.[5] The search for and introduction of new, truly revolutionary, technological solutions is being combined in the country with daily work on the improvement of the available equipment and technology and the mass automation, modernization, and renovation of production (Hungary and the CSSR have embarked on the same path). Here the introduction of fundamentally new equipment is speeding up modernization. In particular, "robotics is not a simple 'addition' to technology—it is becoming a catalyst of the modernization of all technological processes. The mass use of industrial robotics is

the basic factor of the wave of rationalization."[6] The production system is being pulled up to the level of the requirements of new technologies. Therefore, in the GDR it is believed that the main problem now consists not only in the achievement of high individual results at individual technologically and technically advanced enterprises, but in the universal, comprehensive modernization and automation of production. Thus, owing to computer-aided design systems the technical and economic parameters of objects can be improved by 5-15 percent, labor productivity will increase by 25-50 percent, while the time of designing itself will be reduced to one-fourth to one-half.[7] At present in the GDR about 140 designs in the area of automation have been implemented, which has made it possible to increase labor productivity by two- to tenfold. By 1990 in the metal working industry it is planned to implement not less than 60 comprehensive designs in the area of automation and in other sectors of industry to implement not less than 35.[8] In the Hungarian People's Republic in the next few years about 1 billion forints are being allocated for the automation of production, as a result of which 2,000 industrial robots will be introduced in the national economy by 1990.[9]

The Soviet Union has also taken the same path. "The new technical renovation of the national economy, which has been outlined by us," M.S. Gorbachev noted, "is backed by a program of the modernization and development of domestic machine building, which is unprecedented in the entire history of the country. By the early 1990's the updating of its products for the most part should be completed, and new equipment will flow in a broad stream into all sectors of the national economy."[10] As a whole by the end of the century it is planned to provide 80 percent of the machine building products of the USSR with computerized control systems.[11]

In the European CEMA countries the contradictions, which are arising between the various directions of scientific and technical progress, are being reduced during the improvement of the methods of planning. Particular emphasis in such improvement is being placed on the formulation of long-range concepts of the development of science and technology and programs of scientific and technical progress; on the coordination of programs with the five-year plan, which is being combined with steps on the transformation of the latter into the main tool of the management of the economy. The extensive use of goal program methods is a distinctive feature of planning and management at the central level. The national long-term programs of the development of science and technology (in Hungary, Bulgaria, Romania, the USSR, and the CSSR) contain priorities and problems, goals and tasks, and measures and resources for their fulfillment. During 1981-1985 from 16 to 30 percent of all the resources for the development of science and technology were allocated for these purposes in the CEMA countries.[12] In a number of countries (the GDR, Bulgaria, Hungary, the USSR, and the CSSR) during 1986-1990 as the reference base in all planning work the task has also been posed to direct attention to scientific and technical progress and to plan in all spheres of the national economy the production of advanced innovations, which satisfy world requirements. In the GDR, as of 1983, and in Bulgaria, as of 1986, the plans on science and technology have been drafted earlier than the other sections of the national economic plan.

Further intensification involves the solution of the serious problem of the combination of the planning of scientific and technical development and its management at the level of the national economy and the basic economic unit (the enterprise) and the coordination of social and collective interests in case of innovative activity on the basis of the consideration and linking of national economic and cost accounting efficiency. This problem is arising precisely due to the separation in time of the impact from use and the expenditures at the enterprise, which is introducing the innovation, and their transformation into socially necessary expenditures. Under the conditions of comprehensive intensification the stochasticity of the effect of scientific and technical progress is increasing. The time and place of the appearance of an innovation, which is suitable for practical use, are difficult to predict, and "it is possible only to determine the 'zone' of potential success."[13]

The stochastic nature of the practical suitability of the results of research and development, the uncertainty and the high level of expenditures on them, and the variability of the times of the passage of an innovation from invention to introduction determine the peculiarities of the planning activity and the economic supervision of the innovative work of enterprises. The broadening of the economic operational independence of enterprises is being accompanied by the improvement of the centralized management of scientific and technical development. The sound determination of the priorities ("zones") of the development of science and technology, the accumulation and distribution of resources for the introduction of pioneer innovations, the support of enterprises during the period of assimilation, and the creation of the economic conditions for the unimpeded dissemination of innovations are becoming the main tasks of central organs of planning and management. Central programs of development are being implemented in accordance with such a principle in Hungary.[14] For example, a system of preferences and the state stimulation of the extensive introduction of electronics at enterprises has been developed for the implementation of the program of the development of electronics for 1986-1990. Capital investments of centralized funds are being allocated only for the accomplishment of intersectorial tasks.

The spending on the development and introduction of innovations is very significant, while in priority areas it is increasing even more. According to some estimates, the initial stages of the innovation process—research and development—account for 15-30 percent of all the

expenditures necessary for the implementation of innovations, according to others, they account for 30-50 percent.[15] But this is only a part, and not the most significant part, of the spending on innovations. It supplements the capital investments in the introduction and dissemination of innovations. Two- to threefold more assets are being spent just on the organization of pilot production.[16] During the period of the planned introduction in industry of major inventions scientific and technical progress is ensured by the increase of production accumulation for the retooling of the production system.

The possibility of assuming the risk of large capital investments depends on the payback period of innovations, the scale of production reforms, and the compensatory and stimulating functions of the economic mechanism. Therefore, the slowing of the pace of scientific and technical progress and, consequently, the processes of intensification can be not only a consequence of a lack of inventions, the lagging of research, or the weak innovative activity of associations and enterprises, but also a result of the inefficient distribution or the limitedness of the material resources and capital investments, which are being allocated for the introduction and dissemination of an innovation and for the creation of fixed capital, which should provide an economic return.

For all the objective difficulties of the coordination of national economic and cost accounting interest in the use of scientific and technical achievements they are still relative and are being overcome by the development in the CEMA countries of such an economic mechanism, which clears the way for the objective trend toward the shortening of the time of the implementation of innovations. This is one of the means of combining the advantages of socialism with the achievements of scientific and technical progress. World experience shows that not so much the possession of even major inventions and discoveries as the ability to implement them in practice and to disseminate them as quickly as possible in one's own country and abroad plays a decisive role in the intensification of expanded reproduction on the basis of the increase of the efficiency of scientific and technical progress. The return begins with the start of dissemination, and the broader this process is, the greater the recovery of the expenditures is. Here the economic mechanism should not compel introduction, but should create such conditions, under which the national economy would "absorb" the innovation of an enterprise, the profitability of which should depend on the extent of use of scientific and technical achievements.

According to international standards, the time of the introduction of new items and technological processes in practice should not exceed 5 months.[17] However, it is now still too early to speak about such a time for the majority of CEMA member countries. The necessity of the consideration of the law of the economy of time is the most important guideline of the goal-oriented science and technology policy of the socialist states. In this connection the question of the necessity of increasing the quality and competitive ability of a product and of improving the economic mechanism in this sphere is objectively and inevitably arising. First of all, this applies to the processing industry, in which the sectors, which are the vehicles of scientific and technical progress, are concentrated.

The processing industry is the most dynamic and promising sector of the national export potentials of the CEMA countries; the demand for its products is rapidly increasing. According to the data of UNIDO, the share of the socialist community in the world standard net output of the processing industry came to 15.2 percent in 1963 and 24.9 percent in 1984 (this indicator of the developed capitalist countries decreased accordingly from 77 to 63.5 percent).[18] At the same time, the share of the CEMA countries in world trade does not exceed 10 percent, and it is even less in trade in industrial items.[19]

Particular importance in the processing industry is being assigned to electronics and microelectronics. During 1970-1985 the reciprocal commodity turnover of the CEMA member countries in computer hardware increased by thirty-twofold.[20] At the same time one should admit the fact that the share of modern equipment in the reciprocal trade of these countries still does not exceed 10-15 percent.[21] Moreover, inadequate attention is being devoted to the factor of the rapid obsolescence of the results and achievements of scientific thought and the obsolescence of fixed production capital. For the period of updating for computer hardware comes to 4-6 years, while for items of microelectronics it comes to 3-5 years.[22] All this is making new demands on export items. Indeed, competitive ability is not a constant. It changes under the influence of numerous factors (demand, the conditions of reproduction, and so on).

In recent times this trend has appeared especially clearly in case of trade in those goods, which conform to the greatest degree to the latest achievements of science and technology and are oriented toward the needs of the world market. Therefore, for the purpose of increasing their competitive ability and quality the corresponding adjustments are being made in the economic mechanisms and legislation of the socialist countries. Thus, goods, which are being sent to the foreign market, as, in particular, it is noted in the legislative act of the GDR of 1 December 1983, should meet such criteria as the increase of the use value as compared with the old item by 30 percent; the decrease of the expenditures of materials and energy by not less than 25-30 percent; the reduction of production costs by 20 percent; the increase of the export profitability by more than 10 percent as compared with the average profitability for this group of items.[23]

The same kind of work is being performed by the USSR State Planning Committee, which has introduced in the section of the plan "The Development of Science and Technology" new indicators: the updating of products in

production, the share of products, which correspond to the world technical level, the introduction of advanced base technologies and new types of equipment, as well as the indicator of the share of machines, equipment, and instruments, which are furnished with automated control systems (including on the basis of the use of microprocessor equipment), in the volume of production of the most important types of products. It is noteworthy that only equipment, which ensures the increase of labor productivity and reliability by not less than 1.5- to 2-fold and the decrease of the specific metal content by at least 12-18 percent and the specific power-output ratio by 7-12 percent, is included in the indicated section.[24]

However, the problem has not yet been completely solved. At present, as M.S. Gorbachev stressed in the report at the June (1987) CPSU Central Committee Plenum, "the development of new organizational structures, which ensure...the direct inclusion of science in production and, on this basis, a breakthrough to the world level of quality," is necessary.

Thus, the economic mechanism, which takes into account the laws of scientific and technical progress, in the interests of comprehensive intensification should guarantee: first, the shortening of the cycles of scientific and technical progress at priority works and in the national economy as a whole, as well as the time lag between inventions or discoveries and the obtaining of the first practical results; second, the unimpeded and rapid duplication and dissemination of innovations, the majority of which have an intersectorial purpose and should not be turned into the "property" of departments and sectors. Enormous reserves of the intensification of reproduction are concealed in this area. Thus, in the Soviet Union 80 percent of the new developments are introduced at only one enterprise, less than 20 percent are introduced at three or four, and only 0.6 percent are introduced at more than five works.[25] Third, the transfer of technologies from those works, for which they were developed and where they originated, to other sectors (for example, from heavy industry to the sectors of light industry, from defense sectors to civilian sectors, and so forth), with the making in the innovations of the necessary changes and improvements; fourth, the introduction of inventions and developments of "outlying" institutes, organizations, and individual inventors. Original major inventions can arise outside specially established large scientific centers and not in the sectors, in which their mass efficient use is possible.

In essence the improvement of the economic mechanism does not reflect individual phenomena of scientific and technical progress, but indicates its adaptation to the increasing level of the socialization of science and scientific knowledge and of the entire sphere of scientific and technical activity and its embedding as an integral component in the process of expanded reproduction.

The improvement of the mechanism of the management of scientific and technical progress in the CEMA countries at present is regarded as a complex national economic problem. It includes the improvement of the elements of the organization, planning, financing, and economic stimulation of scientific and technical activity. The experience of the CEMA countries shows that attempts to improve only individual elements of the mechanism of the management of scientific and technical progress, without affecting social and economic life as a whole, do not yield the desired and stable results. At the same time the contradictions, which are inherently characteristic of scientific and technical progress, should be resolved on the basis of the improvement first of all of the system of planning. Here the practice of little variance in the planning and management of innovation processes is characterized by an obviously high proportion of failure and by the intensification of production on the basis of rationalization and evolutionary scientific and technical progress.

The organizational forms of the integration of science and production are developing in several basic directions. These are, first, the concentration of scientific and technical activity in large production economic units; second, the development of cooperative relations between the participants in the scientific and technical cycle; third, the improvement of the organizational structure of the scientific and technical potential and the development of the system of cost accounting scientific, technical, and introducing organizations; fourth, the development of flexible, constantly improving forms of the coordination of scientific and technical activity. Among the named forms there are such ones, for example, as the voluntary unification of economic organizations on the basis of contracts (Bulgaria), joint enterprises (associations) and societies for joint economic activity (Hungary), the organization of cooperation by groups of items (the GDR), and others.

The direct management of scientific and technical progress in the CEMA countries is carried out at the level of the basic economic unit (the enterprise and economic association in Bulgaria, the production enterprise in Hungary, the combine in the GDR, the center in Romania, the production association and scientific production association in the USSR, and the concern in the CSSR). In these organizations, in turn, the role of the scientific and technical unit is increasing.

Specialized cost accounting introducing organizations have been established for intensifying the processes of introduction. Introduction, assistance to enterprises, the dissemination of innovations, the enlistment of the broad masses of workers in creative scientific work, the solution of problems at the meeting point of sectors, and so forth are included in their tasks. At the same time in case of the inadequate economic interest of the basic economic units these organizations will not be able to solve effectively the problems of the acceleration of introduction.

The extensive establishment of engineering-consultation, engineering-introducing, and introducing sectorial and intersectorial organizations, which operate independently on the basis of cost accounting, is necessary. The

rendering of services and assistance in case of the introduction and dissemination of innovations up to contract supervision, start-up, and adjustment operations and the servicing of production are included in their task. They should become kinds of banks of the latest scientific and technical information, advanced know-how, and technology. Much experience of this sort has been gained in Bulgaria, Hungary, the GDR, the USSR, and the CSSR.

In Bulgaria in April 1980 the republic Council of Ministers adopted "The Order on Engineering Introducing Organizations," the establishment of which contributed to the efficient introduction of the achievements of scientific and technical progress and to its cost accounting stimulation. For example, the operating Progress Introducing Organization assumes all the risk for the introduction of innovations, receives compensation from the profit from their sale, and in case of failure requires the return of the invested assets. The activity of similar organizations is concentrated in four directions: the acceleration of the progress of technology in the sector, the increase of the level of scientific service, the planning and coordination of development and the introduction of innovations and the creation of capacities for them, and foreign economic functions. By the middle of the 1980's their number came to 412.[26] Consulting and introducing organizations also operate in other countries, for example, in Hungary and the CSSR—these are so-called gesztor organizations, which in addition actively share gained experience with each other. The Creative Youth Association, the Pannonia Company Innovation Agency, Novax, and Novotrade are operating successfully in Hungary, the Inex-Berlin Association is successfully operating in the GDR.

In the Soviet Union the Energotekhprom Pilot Production Technical Enterprise encompasses a design and technological bureau with scientific research subdivisions, an experimental production base, and a pilot machinery plant. Owing to such a concentration of the elements of the "science—technology—production" system Soviet introducing organizations have the opportunity to ensure the extensive duplication of all developments which correspond to their specialization. Experience has shown that such an approach to the organizational activity of the introducing unit yields a large impact. The mass use of new equipment and technology enabled the Energotekhprom Enterprise to shorten on the average by 40 percent the time necessary for the introduction of the largest and most important developments.[27]

When evaluating the results of the activity of enterprises in the scientific production sphere indicators, which characterize the efficiency and quality of work, the end results, as well as the saving of resources (in the GDR, for example, the consumption of basic materials per 100 marks of commodity production, an analogous indicator also exists in Bulgaria), have begun to be used extensively.

In the majority of countries the questions of technical development are being settled mainly on the basis of self-financing. A large portion of the expenditures for these purposes is covered by the internal assets of sectors, production associations, and enterprises. Technical development funds are being established from additional charges on the production cost. In some countries the deductions for these funds are established centrally and are in effect in unchanged form for many years (Romania), in others they are established in the amount of the planned need for assets (the CSSR), while in several the enterprises themselves select the method of financing these expenditures. In Hungary, for example, for the majority of enterprises the establishment of a technical development fund is not mandatory. They can cover the spending on technical development by attributing it to the product cost. At the same time for several sectors and works (mainly in machine building) the establishment of a technical development fund is mandatory. The size of the deductions and the amount of the fund are specified by sectors, and at times also by enterprises. In Bulgaria the spending on technical development is covered from the fund of expansion and technical improvement, while the temporarily increased spending of enterprises, which is connected with the introduction of new equipment, is financed from the fund of the assimilation of new works, which is also created by means of additional charges on the production cost.

The bulk of the assets of the technical development funds are allocated for the payment for scientific research and development, which are carried out by cost accounting scientific research institutes. The spending on the organization of the exchange of know-how, technical and patent information, and so forth is also financed by means of them.

A portion of the assets of the funds is centralized at the sectorial or departmental level. The purpose of the centralized funds is to finance state programs and the most important state assignments on technical development.

The introduction of scientific research and development in production and their embodiment in specific machines, devices, and technological processes remain, as before, the weak link in the area of technical development. In this connection the new forms of the combination of science with production: the establishment of scientific production associations, temporary program scientific collectives (Bulgaria, the CSSR), and specialized and introducing organizations, which either operate on the basis of cost accounting or are financed on a proportionate basis, are promising.

The stimulation of the introduction of technical innovations by means of the establishment of temporary advantageous prices for technical innovations, which is being used in the majority of countries, and the granting of various tax and credit breaks to enterprises, which

introduce new equipment, merit attention. In Hungary the establishment of small banks and funds, which specialize in the identification of potential technical innovations and the financing of their introduction in production, has become widespread in recent years.

A search for mechanisms of the linking of the assets for the remuneration of labor with the indicators of the end results of scientific and technical activity is being made. The stimulating system of remuneration for scientific research and planning subdivisions is being improved, the remuneration fund and incentive fund for the introduction of scientific developments are being linked with the results of labor and creative initiative. In particular, such conditions, which make it possible to make decisions on the introduction of an innovation with a specific lead time with allowance made for the establishment of a rational ratio of the risk and the final result, are being formulated in Poland. In this sphere the CEMA countries are noted for great originality, but as a whole the tendency for the functional roles of the wage fund and material incentive fund to converge is appearing. They have become to a greater degree cost accounting funds and are oriented toward collective material interest.

Great prospects in the area of the improvement of the economic mechanism in our country are being afforded in connection with the adoption at the 7th Session, 11th Convocation, of the USSR Supreme Soviet in June 1987 of the Law of the Union of Soviet Socialist Republics on the State Enterprise (Association), in which one of the central places is assigned to scientific and technical progress. Moreover, in the Basic Provisions of the Radical Restructuring of the Management of the Economy, which were approved at the June (1987) CPSU Central Committee Plenum, it is stressed: "The radical reform of the management of the economy of the country is aimed at...the transformation of scientific and technical progress into the main factor of economic growth." The economic organizational conditions for the materialization of this provision have already been elaborated. The taking in the socialist countries of a number of steps on the improvement of foreign economic activity is affording additional opportunities for speeding up the introduction in the practice of management of the achievements of scientific and technical progress. The decrees of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Improvement of the Management of Foreign Economic Relations" and "On Measures on the Improvement of the Management of Economic, Scientific, and Technical Cooperation With the Socialist Countries" of 19 August 1986 are playing an especially large role here.

The analysis of the basic traits of the science and technology policy of the CEMA countries at the present stage of their development leads to the conclusion that the general peculiarities and problems of the acceleration of scientific and technical progress and their organization and management have a number of common traits and arrangements and thereby are conducive to the uniting of the efforts and the integration of the potentials of these states in the accomplishment of the posed tasks. This is appearing in the strengthening of the coordination of economic and science and technology policy by the countries of the community. The decisions of the Economic Summit Conference and the approval of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000 at the 41st (Extraordinary) Meeting of the CEMA Session in December 1985 confirmed the community of interests.

Footnotes 1.

See UNESCO COURIER, No 4, 1983, p 10. 2. See "Trade and Technology in the Electronic Industry: Hearing Before the Subcommittee on International Finance of the Committee of Banking, Housing and Urban Affairs. U.S. Senate, 96th Congress, 2d Session," Washington, 1980, p 110. 3. See EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOSTI, No 10, 1985, pp 6-7. 4. See WIRTSCHAFTSWISSENSCHAFT, No 2, 1984, p 272. 5. See EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV, No 4, 1985, p 29. 6. G. Mittag, "Okonomische Strategie der Partei dient der weiteren Verwirklichung des Kurses der Hauptaufgabe," EINHEIT, No 9/10, 1984, p 806. 7. See ZYCIE WARSZAWY, 17 February 1987. 8. See NEUES DEUTSCHLAND, 7 January 1987. 9. See MAGYAR HIRLAP, 25 February 1987. 10. See PRAVDA, 11 April 1987. 11. See MAGYAR HIRLAP, 24 February 1987. 12. See EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV, No 4, 1985, p 28. 13. G.Kh. Popov, "Effektivnoye upravleniye" [Efficient Management], Moscow, Ekonomika", 1985, p 64. 14. See PROBLEMY TEORII I PRAKTIKI UPRAVLENIYA, No 1, 1985, p 23. 15. See "Sotsialno-ekonomicheskiye protivorechiya nauchno-tekhnicheskoy revolyutsii pri kapitalizme" [The Socioeconomic Contradictions of the Scientific and Technical Revolution Under Capitalism], Moscow, "Mysl", 1985, p 11. 16. Ibid. 17. See WIRTSCHAFTSWISSENSCHAFT, No 1, 1985, p 119. 18. See UNIDO, "Industry in the 1980's. Structural Change and Interdependence," New York, 1985, pp 16, 21. 19. See POLITYKA. EKSPORT. IMPORT, No 19, 1985, p 13. 20. See "Press Release of the 40th (Extraordinary) Meeting of the CEMA Session. The Council for Mutual Economic Assistance. Press Center," No 2, December 1985, p 3. 21. See NEPSZABADSAG, 18 March 1986. 22. See B.M. Mikhaylov, V.Ya. Neroda, M.N. Kuznetsov, "Gibkiye avtomatizirovannyye proizvodstva" [Flexible Production Systems], Moscow, "Znaniye", 1985, p 4. 23. See WIRTSCHAFTSWISSENSCHAFT, No 1, 1985, p 119. 24. See G. Stroganov, "The Machine Building Complex During the 12th Five-Year Plans: The Prospects and Priorities of Development," KOMMUNIST, No 10, 1986, p 66. 25. See IZVESTIYA, 29 January 1985 and 4 January 1986. 26. See RABOTNICHESKO DELO, 4 April 1984. 27. See IKONOMIKA, No 6, 1986, p 87.

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Paton on Assurance of Dynamism of Science

18140144 Moscow PARTIYNAYA ZHIZN in Russian No 21, Nov 87 pp 26-30

[Article by President of the Ukrainian SSR Academy of Sciences Academician B. Paton, twice Hero of Socialist Labor: "Ensure the Dynamism of Science"]

[Text] In 7 decades the Soviet Union has covered a long path of historical development. The strategic party policy of restructuring and acceleration, which is being implemented today, has as a goal the achievement of a new qualitative state of our society on the basis of the radical updating of its material and technical base.

Restructuring signifies the critical reinterpretation of the experience of past years and the elaboration of new approaches in practical matters on the basis of the precise consideration of realities. The period of stagnation, unfortunately, also left its mark on science. Complacency and satisfaction with a little are its characteristic traits. In order to become an effective tool of restructuring, as was envisaged by the 27th party congress and the CPSU Central Committee Plenums, science itself needs to be restructured and to acquire the proper dynamism. It is a matter of putting into effect the factors of the intensification of scientific activity itself, of obtaining important scientific results, and of achieving the use of new knowledge in practice. Here it is important to concentrate forces and assets on the priority directions of research, of which the development of equipment and technology, which are not inferior to the best world models and, what is the main thing, surpass them, will be the end result. The further improvement of scientific organizational work is also called upon to play a considerable role here.

Taking into account the multidimensional nature of the problem of the restructuring of science, I will dwell on just two of them. The first is one which concerns the content of scientific research and its orientation, and the second is an organizational one, which has to do with the use of scientific results in the national economy.

Much was also said and written earlier about the fact that the development of basic research should be the main task of science. But in practice a utilitarian approach was applied to it and the unfounded demands to yield an immediate impact were advanced. Such a shortsighted approach often led to the loss of previously made gains and to a lag in key directions, as happened at the Institute of Superhard Materials of our academy.

Life has convincingly shown that one must not economize on basic research. The finding and study of new phenomena and laws of nature revolutionize production and determine the directions of the progress of technology. Giving rise to the principles of new technology, basic research provides the applied sciences with results, they can and should be turned into powerful forces of the development of production. Any lag here adversely affects the scientific and technical potential of the country and checks the pace of the progress of equipment and technology.

Practice itself confirms: purposeful basic research is becoming today an effective means of increasing the practical return of science. Therefore, restructuring in science should begin precisely with basic research. The main thing here is the development of the priority scientific directions, the elaboration of urgent and long-range problems, and the formulation of the corresponding scientific programs.

The task of the priority development of basic research and the significant increase of its return requires the formulation of priorities, as well as profound qualitative changes in its planning. This work cannot be the internal affair of institutes alone, but should become an important function of republic scientific councils for problems, which were recently reorganized in conformity with the requirements of restructuring. The essence of the reorganization consists in the decisive increase of the level of work on the evaluation of the state and the prospects of development of research, on the preparation of sound forecasts, and on the determination of the priorities in the scientific directions which are attached to the councils.

The formulation of a number of scientific programs on the most promising problems was the result of such an approach. High-temperature superconductivity is one of them. Among the urgent problems of modern scientific and technical progress is the development of membranes and membrane technology, as well as the devising on the basis of the latest scientific data of sensor-transducers of chemical and physical quantities. The development of many fields of science and production, particularly instrument making, robotics, and automated control systems, is governed to a significant extent by their availability.

The use of so-called directive principles in the planning of basic research is contributing to a large degree to its intensification and to the increase of its efficiency. This is making it possible not to allow such a situation, when individual scientists for many years elaborate, in essence, the same theme, while changing its name only slightly. We regard the attempts of institutes to evade the fulfillment of "directive" themes as inertia and the reluctance to reform. Directive planning, in essence, is a form of the realization of the state order on the development of science, as is envisaged by "The Basic Provisions of the Radical Restructuring of the Management of the Economy."

The urgency of scientific themes, the timeliness of the start of their elaboration, and, consequently, the end results of the labor of scientists in many respects are determined by the level of work on forecasting, since under present conditions the role of the forecasting

function of science is increasing as never before. It seems that restructuring itself in science also signifies a change of the attitude toward forecasts. It is dangerous to ignore them, as frequently happened in the past, for they lay the theoretical foundations and provide the necessary guidelines for scientific, economic, and social planning. In short, now as never before detailed forecasts in all scientific directions are needed so that it would be possible to foresee the development of science itself and to identify the problems that require solution.

In restructuring their activity, the institutes of the Ukrainian SSR Academy of Sciences and the reorganized councils for problems are striving to promptly identify and take into account the trends of development of science and technology, are improving forecasting methods, and are increasing the attention to questions of the evaluation of the world level. They are taking an active part in the large amount of work on forecasting, which is being performed at the USSR Academy of Sciences. In such an approach we see the prerequisites of a substantial return of scientific research.

Today we are witnesses to radical changes in the economic life of the country. Fundamentally new features are appearing in it. The radical restructuring of the management of the economy has started, the Law on the State Enterprise (Association) has been adopted. The principles of cost accounting, self-support [samookupayemost], and self-financing are being introduced in practice not in words, but in deed. New favorable conditions are being created for the development of initiative and socialist enterprise, many obstacles and restrictions on the economic activity of enterprises, which previously bore the impression of strong-willed administrative decisions, are being eliminated. In the achievement of the highest end results the main emphasis is being placed on the large-scale use of the achievements of scientific and technical progress and the resolute updating and modernization of production on the latest technological basis.

Thus, there is in evidence a qualitative change of the "external environment," in which the scientific research organizations of the country operate. This is introducing new elements in their work and is raising urgent and difficult questions. On the other hand, the arising problems should be solved quickly and in a high-quality manner, while ensuring the maximum impact. Under these conditions science has to react promptly, with the minimum losses of time to the changes occurring in the economy and to make its increasing contribution to the transformations that are being accomplished. The way out here lies in the further intensification of the restructuring of the activity of scientific organizations, in the lending of greater dynamism to it, in the active use of intensive factors, and in the resolute rejection of obsolete forms of the organization of work.

The assurance of the rapid advance of scientific achievements into production, first of all the technologies developed on their basis, and the gradual increase of the influence of science on the sectors of the national economy have become a most important direction of the restructuring of the activity of the academy.

The importance of advanced technologies as the main unit of modern scientific and technical progress is constantly increasing. Conformity to the world level and the exceeding of it, a resource- and energy-saving orientation, and ecological cleanness are a necessary quality of them. Along with such characteristics of technology as a low-waste and waste-free nature, the safety of their use is also being placed in the forefront. Effective prerequisites for the harmonization of the interrelations of socialist society and nature can be created and are being created precisely on this basis.

The basic direction of the work in this area is seen not only in the rapid development of new technologies, but also in the significant expansion of the scale of their introduction. The existence at the Ukrainian SSR Academy of Sciences of a developed experimental design and production base, which now numbers more than 80 enterprises, is helping to successfully accomplish these tasks.

The new mechanism of the activity of enterprises and associations, their changeover to full cost accounting and self-financing, and the transition to the self-management of labor collectives are contributing to a significant degree to the restructuring of the work of the experimental design and experimental base. The academy is already now dealing objectively with all this, trying to use to the utmost the opportunities being afforded for the improvement of the activity of scientific institutions.

Scientific technical complexes (NTK's) have been formed and are operating successfully. Institutes, design bureaus, experimental works, and pilot plants are a part of them. By performing the entire cycle of operations from the idea to introduction, they are contributing to the significant shortening of the time of the practical implementation of scientific developments. Eight such complexes are now operating, and with the emergence of favorable conditions and needs new ones will be established. These structural formations are contributing to the greater effectiveness of science and are drastically shortening the time of the development and introduction of technical innovations. For example, in less than 2 years a new cutting tool for the cutting of mine drifts and the drilling of large-diameter shafts was developed and introduced by the efforts of the Fiziko-mekhanicheskiy institut imeni G.V. Karpenko Scientific Technical Complex jointly with organizations of the USSR Ministry of the Coal Industry.

In order to implement modern, truly revolutionary developments, at several scientific technical complexes special structural subdivisions—engineering centers—have been established. They work on specific problems of the development and improvement of equipment and technology. Here they work in close cooperation with

related scientific research and planning and design organizations. The centers on their own or on the basis of cooperation organize the production of single specimens or test series of the latest equipment, instruments, and materials.

We consider it important that the engineering centers are preparing proposals on the organization of the series production of new equipment and are drafting the planning and design documentation for the large-scale introduction of highly efficient technologies, which are based on the latest achievements of basic science. Moreover, the retraining of engineering and technical personnel for production is being carried out on the basis of the centers. Now 10 such centers are operating at the Ukrainian SSR Academy of Sciences.

The experience and base of the scientific technical complexes of the Ukrainian SSR Academy of Sciences served as a good basis for the establishment of interbranch scientific technical complexes (MNTK's). We have two of them. These are the Institut elektrosvarki imeni Ye.O. Patona and the Poroshkovaya metallurgiya complexes. Scientific institutions of the academy are participating in seven other interbranch complexes.

Considerable organizational work with the corresponding ministries and departments has been performed by the Institute of Electric Welding and the Institute of Problems of Material Science—the main organizations of the interbranch scientific technical complexes. The joint development and assimilation in production of new generations of welding equipment, means of the integrated mechanization and automation of the production of welded components, and advanced technologies of the application of strengthening and protective coatings and the obtaining of new materials and items by the methods of special electrometallurgy have already been started. Work has also been launched on the development of new types of equipment and technologies in the area of powder metallurgy, which correspond to the world level or surpass it.

At the same time the interbranch scientific technical complexes for the present are not ensuring the sharp acceleration of the development of science and technology in the directions attached to them. The extensive rights, which have been granted to them, are still not being fully exercised.

What is the reason? To some extent the difficulties of growth are having an effect. The new structural formations, and the interbranch scientific technical complex is also grouped precisely with such formations, do not immediately yield fruits. Daily, painstaking work on the winning by each interbranch complex of prestige and firm positions in the complex economic mechanism is necessary. The new model statute on the interbranch scientific technical complex, which is being prepared, should aid this. But one of the basic difficulties consists in the joining of the developments of the complexes with series industrial production. Here much work still has to be done.

For a long time there was not a proper return from the cooperation of the Ukrainian SSR Academy of Sciences with the sectors of the national economy. Today specialized production engineering subdivisions—support centers, which are being organized by our institutes directly at interested enterprises of industry, construction, and agriculture, are helping to solve this problem. Their supply with personnel and the necessary equipment and resources is being accomplished by means of the staffs and assets of the enterprises themselves. The support centers carry out the preparation of production for the use of new equipment and technology at the base enterprise and subsequent dissemination at other enterprises of the sector.

Tens of support centers of 11 institutes of the Ukrainian SSR Academy of Sciences have been established in various regions of the country. In particular, support centers for the introduction of pipe welding complexes are in operation in the system of the Ministry of Construction of Petroleum and Gas Industry Enterprises. Centers for the machining of parts of tractor engines, the application of antifriction coatings to the surfaces of the cylinder sleeves and pistons of internal combustion engines, and the thermotechnical processing of agricultural raw materials have been established at enterprises of the Ukrainian SSR State Agroindustrial Committee.

The new subdivisions are expanding substantially the sphere of application of scientific developments. In many cases they are being formed on the initiative of local party organs. The availability at an institute of a completed development of great practical importance, as well as the willingness of the enterprise to assume the trouble of its dissemination on the scale of the sector or region are a criterion of the advisability of establishing new support centers.

Now, when the sectors of the national economy are making a sharp turn toward science and are striving to use as much as possible its latest achievements, the system of state orders is undergoing greater and greater development. Its principles are also being used in numerous scientific and technical programs of various levels. As a result of their implementation modern machines, equipment, materials, and automated control and monitoring systems have already been developed.

The decree of the CPSU Central Committee and the USSR Council of Ministers "On the Changeover of Scientific Organizations to Full Cost Accounting and Self-Financing" undoubtedly serves the dynamism of science. The document envisages, in particular, the transition from the financing of the maintenance of scientific organizations to the financing of scientific developments and the more extensive use of the internal assets of

scientific organizations as a source of financing. This, of course, requires the revision of the themes of research, the increase of their urgency, the change of the structure of scientific institutions, and the training of personnel of high skill. Under these conditions, in our opinion, the importance of participation in the fulfillment of scientific and scientific and technical programs, the assignments of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000, and state orders is increasing.

Dynamism in science cannot be achieved without the radical improvement of the work with personnel. Structural changes alone at the institutions of the Ukrainian SSR Academy of Sciences are not enough for the achievement of this goal. It is necessary to be constantly concerned about the increase of the creative return of each scientist, about the influx of well-trained, resourceful young specialists, and about the strengthening of the creative collectives which are working in priority directions.

We are devoting the closest attention to the basic unit of management personnel—the directors of scientific institutions. It must be admitted that a number of them for the present are not fulfilling their duties in conformity with the requirements of the times; many cannot organize in the new way the work of the collectives headed by them, are not displaying proper demandingness on subordinates and on themselves personally, and are losing the authority of a scientist, turning into mediocre administrators.

Consulting party organizations and scientific collectives, we have been forced to replace those, who are not capable of reforming their thinking and style of work in conformity with the tasks of the day and of ensuring a sharp turn not in words, but in deed in the direction of the intensification of research and the sharp increase of its practical return. Thus, during the period since the April (1985) CPSU Central Committee Plenum the directors of 12 institutes, including the Donetsk Physical Technical Institute, the Institute of Plant Physiology, the Institute of Geology and Geochemistry of Combustible Materials, and the Institute of Art Criticism, Folklore, and Ethnography, have been relieved of the positions they held. The task to lead the collectives of these scientific institutions onto the path of the intensification of scientific research has been posed for younger and more energetic managers, for which they are to use more actively the human factor, to rely more completely on the opinion of subordinates, to show concern for the intensification of the democratization of management activity, and to introduce more boldly the principle of appointment by election to management posts.

At the same time as this we are directing the attention of the managers of sections and departments of the academy and the administration and collectives of institutes to the need for the intensification of the work on the formation of an effective reserve for promotion to management positions. It is no secret that at a number of our institutions a reserve of personnel in practice is lacking. We do not intend to tolerate this. Steps on the increase of the level of skills of the management personnel of our institutions have been outlined and are being implemented. In particular, special school-seminars have been organized and are operating for this category of personnel. Work is also being performed on the establishment in the system of the Ukrainian SSR Academy of Sciences of the Institute for the Improvement of the Skills of Management Personnel and Specialists.

New criteria of the evaluation of the activity of personnel were presented during the past certification of personnel. The questions of the efficiency of the scientific work of everyone who took this test were placed at its center. Not everyone passed it. In all 2.4 percent of the workers to be certified were recognized as not conforming to the held position, 88 people were dismissed. Heads of departments and laboratories are also among them.

At the same time it was impossible to dispense with recurrences of work in fits and starts. The administration and party organizations of several institutions of the academy—the institutes of hydromechanics and archaeology—approached the certification formally. In particular, here the references were prepared in haste, they were not discussed openly. Moreover, they attempted to replace certification with the reduction of staffs and to deal with "obstinate" personnel. Now the party aktiv of the institutes should have expressed its opinion. But it proved to be unprepared for this.

It is becoming more and more obvious: one must not relax the drive for new approaches in the work with personnel, it is necessary to check it against the highest criteria, which are being presented to scientists in our times of profound changes, acceleration, and the increase of the democratization of all aspects of life.

Science of our days is a powerful lever of socioeconomic progress. The lending to it of greater dynamism, the more complete and rapid use of its latest achievements in all spheres of the life of society, and the attainment of leading positions in the world are the most important tasks which were set for it by the 27th CPSU Congress. The restructuring in science, which now encompasses every creative collective, is also aimed at their accomplishment.

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New Members Elected to Lithuanian Academy of Sciences

18140164 Vilnius SOVETSKAYA LITVA in Russian 31 Dec 87 p 3

[Article (ELTA): "The Election to the Lithuanian SSR Academy of Sciences"]

[Text] A session of the General Assembly of the Lithuanian SSR Academy of Sciences, at which organizational questions were discussed, was held on 30 December. New full members and corresponding members of the Lithuanian SSR Academy of Sciences were elected.

There were elected as full members (academicians) of the Lithuanian SSR Academy of Sciences: Doctor of Technical Sciences Professor Yurgis Vintsovich Vilemas, director of the Institute of Physical Technical Problems of Energetics of the Lithuanian SSR Academy of Sciences (power engineering); Doctor of Physical Mathematical Sciences Professor Bronyus Ignovich Grigelenis, head of a department of the Institute of Mathematics and Cybernetics of the Lithuanian SSR Academy of Sciences (mathematics); Corresponding Member of the USSR Academy of Sciences and Doctor of Technical Sciences Professor Kazimeras Vitautovich Ragulskis, director of the Vibrotekhnika Scientific Center of Kaunas Polytechnical Institute imeni Antanas Snechkus (mechanics); Doctor of Economic Sciences Professor Raymundas Lyaonovich Rayatskas, academician secretary of the Social Sciences Department of the Lithuanian SSR Academy of Sciences (economics).

There were elected as corresponding members of the Lithuanian SSR Academy of Sciences: Doctor of Physical Mathematical Sciences Professor Raymundas Stasevich Dagis, deputy director of the Institute of Semiconductor Physics of the Lithuanian SSR Academy of Sciences (theoretical physics); Doctor of Physical Mathematical Sciences Vintsentas Ionovich Denis, head of a laboratory of the Institute of Semiconductor Physics of the Lithuanian SSR Academy of Sciences (experimental physics); Doctor of Philological Sciences Professor Zigmas Pyatrovich Zinkyavichyus, head of a chair of Vilnius State University imeni V. Kapsukas (linguistics); Doctor of Historical Sciences Vitautas Yuozovich Merkis, acting director of the Institute of History of the Lithuanian SSR Academy of Sciences (history); Doctor of Biological Sciences Gedimias-Yonas Bronislavovich Paulyukyavichyus, head of a laboratory of the Geography Department of the Institute of Zoology and Parasitology of the Lithuanian SSR Academy of Sciences (ecology); Doctor of Physical Mathematical Sciences Professor Lyudvikas Yonovich Pranyavichyus, head of a chair of Kaunas Polytechnical Institute imeni Antanas Snechkus (the element base of computer technology); Doctor of Physical Mathematical Sciences Mifodiy Parmenovich Sapagovas, deputy director for scientific work of the Institute of Mathematics and Cybernetics of the Lithuanian SSR Academy of Sciences (mathematics); Doctor of Philosophical Sciences Lionginas Klemensovich Shepetis, secretary of the Lithuanian CP Central Committee (philosophy); Doctor of Chemical Sciences Professor Benediktas Antanovich Yuodka, head of a chair of Vilnius State University imeni V. Kapsukas (physical chemical biology); Doctor of Biological Sciences Eugeniyus-Arvidas Andrevich Yanulaytis, head of a division of the Fermentas Scientific Production Association (biotechnology).

Academician Raymundas Lyaonovich Rayatskas was approved as academician secretary of the Social Sciences Department of the Lithuanian SSR Academy of Sciences.

President of the Lithuanian SSR Academy of Sciences Academician Yuras Karlovich Pozhela and Styaponas Yuozapovich Imbrasas, chief of the Science and Educational Institutions Department of the Lithuanian CP Central Committee, congratulated the new full members and candidate corresponding members of the Lithuanian SSR Academy of Sciences.

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Ties Between Science and Industry in Turkmen SSR

18140141 TURKMENSKAYA ISKRA in Russian 17 Nov 87 p 3

[Interview with Academician O. G. Ovezgeldyyev, President, Turkmen SSR Academy of Sciences, by D. Bayborodina: "A Face Towards Practice"]

[Text] **[Question] Oraz Geldiyevich, the perestroyka taking place in the country requires strengthening the tie between science and practice. In light of this, today I would like to talk about improvements in the activities of the TSSR Academy of Sciences.**

[Answer] It makes sense to begin with this. At the TSSR Academy of Sciences there has been a comprehensive inventory of developments proposed by our scientific institutions for introduction in the national economy. Attention was on the past decade. The list includes more than 50 proposals. We analyzed them and concluded that among the scientific developments which have found practical use only a few are large scale works. As examples I would cite the automated data processing system for deep earth research, seismic regionalization maps and results from some research in radiophysics.

Most of the developments introduced involve contracted orders, mainly methodological or cartographic materials, single models of instruments or devices.

Almost half of the list was work in technical and engineering areas. These are of great practical value in improving existing production operations, but require serious experimental-production testing and detailed economic feasibility studies. Studies here are in the interest of practical workers. Only they can create the conditions necessary for testing. The Academy system still does not have the appropriate facilities and exprimental plants for this.

[Question] If production workers remain indifferent to innovations, then they will remain scientific achievements in dissertations?

[Answer] It is a familiar situation. However, we don't need studies to once again prove to ourselves that scientific results remain unused. We must adjust the tools which help us manage the practical introduction of developments.

The inventory revealed the five developments which are most urgent sociallly and economically. These are: the economic use of bentonite clays technology for the thorough processing of iodine-bromide waters, technology for obtaining calcium bromide, the biological treatment of collector drainage water and the use of soybeans as animal feed. Although they have still not been worked out for all these areas, the Academy of Sciences Presidium, jointly with the management of the ministries involved, has introduced detailed programs for joint work by scientists and practical workers to accelerate the mastery of scientific developments and to extensively introduce them into the national economy.

[Question] Is this to be viewed as the beginning of a transformation which will lead to new forms of ties between science and production?

[Answer] In principle, of course, but major changes have still not been made. Scientific developments are still being introduced on the same basis — contracts between scientists and production workers — only they are more solid. As is known, today another, fundamentally new approach to applying basic research is being mastered: MNTK [Intersectoral scientific-technical complexes]. These include academy institutes, sector NII and KB, plants, VUZes and associations for embodying ideas into a unified science. The goal for such a formation is to accelerate the movement of scientific ideas towards mass utilization in the national economy.

Engineering centers are another progressive form of integrating science and practical work. This is the name given to problem oriented units on cost accounting which are based upon well equipped academy or sector institutes to work with basic research which has already led to specific results of great practical value. They consist of design and technological departments and are entrusted with bringing new developments to practical realization.

Based upon this, the Academy of Sciences Presidium has begun to study the potentials for organizing two republic MNTK: Heliotechnology and Biomelioration. The first is to make the ideas about solar energy now in dissertations available to various sectors; the second is to overcome conservativism with regard to scientific ideas on the biological treatment of water from collector drainage networks.

We are also thinking about setting up an engineering center to extensively introduce new technology for wear and heat resistant coatings.

Temporary collectives on cost accounting are another widely used mobile, progressive form for organizing scientific research. They are set up within institutes or are formed between institutes, ministries or departments. Unfortunately, however, not a single such institute has been set up within our republic. We need to give this a good thought.

[Question] So, the activities of MNTKs, engineering centers, temporary scientific research collectives on cost accounting are stages in perestroyka for the Academy of Sciences . How can this be accelerated?

[Answer] It is best to define acceleration not to in terms of dates, but of priority problems which must be solved in order for the plan to more rapidly become reality. We need a strong experimental base: experimental sections, shops and plants. There are none in the republic. At present we have far less equipment than the countrywide level. The faulty principle of "residiual financing" and the attitude which treats scientific projects as having secondary importance to the economy naturally hinder scientific and technical progress.

Furthermore, it is necessary to break with habitual ideas. It is necessary to change the attitude toward science held by many economic managers at ministries and departments. Academy scientists should also turn their faces towards practical work. The problem of training scientific cadre has not been solved. For example, in the republic there is no training of specialists in priority directions of science and technology.

The Academy of Sciences Presidium is working on all these problems. Let us go back to the beginning of our conversation. The results from the inventory of programs for accelerating the introduction of specific scientific developments which I mentioned, are nothing more than a dispatch point for a large volume of objective oriented work: both in strengthening the ties between science and practice and in restructuring all Academy activities. We have given ourselves precise guidelines for our efforts.

[Question] You mentioned the need to change the attitude of economic managers towards science, to make them allies, i.e. like-minded thinkers. This applies, of course, to those — and they are still the majority — who are guided by old, well tried methods of production and are afraid of innovations as "threats" to plan fulfillment. They rarely experiment, even if new things promise rewards. One can understand them: They are responsible for fulfilling specific state targets. Can this old psychology be broken only by persuasion and propaganda from science?

[Answer] We do not count on these alone. There is support for our suggestion to create, at the Turkmen Communist Party Central Committee, a Council for assisting in scientific and technical progress in the republic, headed by Saparmurad Atayevich Niyazov, first secretary of the Central Committee. The council will do

basic work on key problems in improving the efficiency of public production based upon science and technology. Its recommendations will be sent to party committees, ministries and agencies in the republic. **[Question] However, if Academy science so diligently searches for a partner in practical work, does this mean that basic research should be directed not simply towards the development of a given field of knowledge, but also towards dealing with specific vital tasks?**

[Answer] Unconditionally. Basic research is now under way in fields of knowledge which are most needed for practical work. This is also helped by comprehensive targeted programs. At the initiative of the Academy of Sciences, these programs are now being worked on: Health, Turkmen-Russian Bilingualism, Ecology and the Scientific Basis for the Use of Natural Resources in the Arid Zone, Renewable Energy Sources.

Our Council for the coordination of scientific research is working in the same directions in the social aims of science. Last September it asked local Soviets, ministries and agencies in the republic these questions: What problems should science solve in your sector? How can they be handled by scientific research institutions in your ministry or agency? What problems should scientific research instititutions in the republic and country be asked to solve? Those questioned actively responded. One hundred and fifty suggestions were made regarding many fields of knowledge and different themes for scientific research work. These were carefully studied, classified and systematized. This resulted in the first official list of specific scientific tasks, the solutions of which are necessary to Turkmenistan's social and economic development. Work is continuing in this direction.

Recently a directive from ministry and agency boards was given to the leaders of Academy institutes. This undoubtedly made them more informed about the most important problems facing the econoy.

Our Economics Institute is conducting thorough research on scientific and technical progress in Turkmenistan. Its results are important for directing basic research towards practical results.

In rearranging its activities, the Academy set about mastering a new management mechanism. It is based on forecasts for the development of Soviet Science, priority directions in NTP and the selection of socially and economically promising areas for research. Changes should be made in the principles of planning and financing.

[Question] What specifically?

Until now the institutes themselves have compiled the thematic lists for scientific research. The dominant factor was dissertation subject matter. Clearly, under such conditions the defense of a dissertation often becomes the crown to scientific research. Often, in order to defend a dissertation more quickly, easier and more accessible subjects are chosen. But this has an effect on cadre policy: in some areas there is a surplus of candidates and doctors, while in others a shortage.

Financing was for institutes and not for scientific ideas, programs and directions. The institutes themselves evaluated the results from completed research. This, of course, could not help but give our scientific units a closed character when it comes to scientific research and to unjustified reductions in criteria for evaluating results.

Academy science will now be planned in this way: Every five years the USSR Academy of Sciences Presidium will compile forecasts for the development of science and NTP in the country and determine priority directions. Planning at the republic level will take this into account and will follow the same principles.

The circle of basic themes is established in a competitive manner. Individual scientists or scientific units present their proposals on urgent scientific and technical problems. The ideas are thoroughly discussed and if highly qualified experts agree to their urgency then they win the right to financial support.

[Question] You noted that traditional methods for evaluating scientific research are not always effective. How can this be corrected?

[Answer] Highly competent evaluation of completed themes and assignments, taking the achievements of Soviet and world science into account and not giving preference to specifics of a region are decisively important in improving the efficiency of scientific research, strengthening its social-economic orientation and accelerating the practical realization of the results obtained.

This is why the TSSR Academy of Sciences recently passed a decree to introduce "outside" reviews of scientific reports. Leading scientists throughout the country will be brought in as experts.

[Question] The last question. How does the strengthening of democraticism in society touch upon the Academy system?

[Answer] We have set up a new procedure for selecting cadre. Candidates for leading positions should be nominated by collectives. Several candidates may be named.

Under the new conditions there will also be elections for heads of laboratories and sections. The TSSR Academy of Sciences Charter, the Statute on departments and other documents are now being changed.

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Conversion of Research Organizations to Cost Accounting

18140204 Tbilisi ZARYA VOSTOKA 16 Jan 88 pp 2-3

[Article by Avtandil Guniya, director, Institute for Economics and Law, Georgian SSR Academy of Sciences, member, Georgian SSR Academy of Sciences: "The Conversion of Scientific Organizations to Cost Accounting Will Increase the Output of Scientists and Assure the Rapid Introduction of Efficient Developments"]

[Text] At the beginning of 1988 scientific organizations at industrial ministries and agencies converted to full cost accounting and self-financing. How will work be organized under the new conditions?

Based on the vast experience in the scientific-technical and social-economic transformation in this country, in the world socialist system and in developed countries with a nonsocialist orientation, on the need to accelerate social-economic development, to create the material-technical base for the radical reconstruction of the national economy, above all, machinery building, to a qualitatively new level, the CPSU 27th Congress posed the task of accelerating NTP in developing socialism. Systematically carrying out the line to thoroughly strengthen science's material-technical base and to create the conditions for scientists' fruitful activity, the CPSU and the Soviet state clearly specified the tasks in further developing and deepening experience in improving the economic mechanism in science and its interaction with production.

In the Guiding Principles [Osnovnyye Polozheniye] for the radical restructuring of the economy's management approved by the June (1987) CPSU Plenum it is stated: "Scientific research and development is to be performed on the principles of cost accounting and self financing, clients pay for scientific developments depending upon their efficiency." The rights and obligations are in the Law "On State Enterprises (Associations)." This law states that scientific institutions, just like any other enterprise functioning in the national ecoonomy, are socialist commodity producers, producing and selling products, performing work and rendering services in accordance with a plan and contracts based upon full cost accounting.

This requires steady development and improvements in the scientific collectives' potentials, intensification and labor productivity, savings in resources and increased profits (income). Scientific institutions (institutes) should: support the collectives' social development, the formation of their modern material base, the systematic implementation of distribution according to labor, social justice, assist in environmental protection and improvement and in other functions improving efficiency and accelerating the rate of scientific-technical progress. If, up until now, scientific collectives have been supported by the state budget and were essentially not materially responsible for the research quality and deadlines, all this was because science, especially in the recent period of economic stagnation, developed not though the intensive use of scientific potential, but extensively, through quantitative growth and increases in scientific staffs. As a result, some institutes' activities were not directed toward substantially accelerating scientific-technical ansd social-economic development and had a weak influence upon production's scientific-technical standards. Resources were fragmented on numerous developments and even on those which had no scientific or practical value. The management methods for scientific organizations began to grow obsolete. It therefore became an urgent task to change the operating methods, practices with clients, systems for planning, financing and providing incentives which scientific organizations had been using for quite a long time and to link their interests with those of production and improve their relationships with superior management organs. All these changes should enhance responsibilities and provide high scientific-technical standards, improve the reliability and upgradability of products (work), reduce the costs and time required to create new equipment, technology and materials and new ways of organizing production and labor.

All this makes it necessary to convert scientific institutions to full cost accounting and self-financing. The new economic management system should become the main economic tool for accelerating scientific-technical progress in the national economy and the basic activities of scientific collectives.

Because scientific institutions should work in accordance with the the USSR Law on State Enterprises (Associations), they, together with production enterprises, should support their own scientific-technical development by selling their products to customers and be fully responsible for the results of their economic (and scientific) activities.

The scientific-technical products of scientific organizations are commodities. Because of this all cost accounting relationships between customers (consumers) and scientific institutions are viewed from the perspective of commercial-monetary relations, i.e. like the purchase and sales of any other commodity. We view a commodity as an economic category, as the unity of its cost and use value. Just as with any commodity, the production of scientific products requires material and labor inputs.

Scientific-technical products include final scientific research, design and technological work and services, experimental models or groups of items (products) completed in accordance with contracts and accepted by the client. To produce such products (services) a scientific institution makes the necessary material and labor expenditures (for wages, the acquisition of the necessary instruments, devices, computer hardware and other expenditures) which make up the production cost for this type of product (work or service). A scientific institution is therefore interested in reducing these costs. This is

organically linked to the most effective (economical) use of material, financial and labor and scientific-technical resources and personnel at its disposal. Because profits are a scientific organization's main source of money for scientific-technical and social development and material incentives (payments to labor), the most rational use of this potential to substantially improve a scientific institutions work indicators is a necessary factor in its normal functioning under cost accounting.

The transition to the targeted financing of specific scientific research and planning design work under contract will replace its general financing and maintenance. The sources for this financing should be mainly the resources of associations, enterprises and organizations , resources from central funds, ministry and agency reserves, bank credits (and, when necessary budget allocations). Here, as with production enterprises, the funds for production development, social-cultural measures and housing construction and material incentives funds are formed.

A contract is the main document regulating relations between a scientific organization and the client (including ministries and agencies) of scientific-technical products. The client pays for such products at contractual prices. If there is no client for research and development, or if work by a scientific organization remains fruitless for prolonged periods (even if the organization is assisted by superior organs) the work can be curtailed.

Depending upon their sphere (and system) of functioning, their are certain features in scientific organizations cosc accounting based activity. Thus, scientific organizations within production associations and enterprises direct their activities mainly towards providing their superior unit's own needs. Their expenditures are for the production costs of association output, or they are compensated through the fund for production development and science and technology in the association; for work done on contract with other enterprises and associations. Scientific-technical products should be included when summing up production association activity. The profits (income) of a scientific organization is included in total association profits (income) and are distributed in the established manner. Scientific organizations operate within production associations on a cost accounting basis as structural units in accordance with the applicable statute approved by the association. They can have individual balance sheets and bank accounts. Although the creative activity of a scientific organization within a production association or enterprise mainly provides for the larger units' needs, this does not mean that the use of scientific potential should remain within the association or enterprise. The returns can be large scale.

Scientific organizations within scientific production associations have broader functions. They should solve the association's basic tasks in developing highly efficient complexes, machinery, equipment, instruments, materials and processes critical to scientific-technical progress in the sector. Their output is included in the scientific-production association's overall results. They operate as structural units or independent organizations enjoying the rights in the law on state enterprises (associations).

Even broader tasks face scientific organizations directly subordinate to ministries and agencies. They should support research and development of a general nature, assist in the wide scale use of progressive technology and new forms of management, be responsible for the high technical standards of production and output in their sector and see that a unified scientific-technical policy is implemented.

In connection with the formation, at the USSR Council of Ministers, of an Office for Scientific-Economic Complexes (for machinery building, fuel and energy, construction, etc) we think that over the long term the functions of scientific organizations directly subordinate to sectoral ministries and agencies should be entrusted to scientific organizations in a scientific production association . These functions include: the use of progressive technology, new forms and methods for production management the attainment of high technical standards. The respective offices in the USSR Council of Ministers should implement a unified science and technology policy.

Academy and VUZ scientific organizations should function on a somewhat different level. They concentrate their activities on fundamental research in the natural and social sciences and on technology, are entrusted with providing the theoretical basis for new equipment and technologies revolutionizing public production and, together with sectoral and factory science, do highly effective applied work of a sectoral and intersectoral nature. Scientific organizations in the academy and VUZ system will be somewhat unique in their financing procedures. Budget financing in the USSR Academy of Science will, apparently, support research ordered by party and soviet organs (state orders), basic research in all union programs planned at the USSR Academy of Sciences Presidium and all union programs of basic research put together by academy departments. Together with this there will be budget financing for basic exploratory research directly at scientific institutions (institutes) without interference by superior organs. Finally, there is research and other work by economic contract financed by the client.

This structure for financing academy institutions also applies to scientific institutions in the USSR Academy of Sciences and the republic academies. This makes it possible for institutes in the republic academies to have closer ties with USSR Academy of Sciences' departments and institutes when working on basic scientific problems.

One feature of this structure, based upon a problem approach to research in working on scientific problems in USSR and republic academy institutes, is that total

financing for each scientific institution will not decline in 1988. The staff make up should be appropriate to the problem approach. Scientific institutions and their subdivisions should have a more accurate idea of the volumes and sources of financing. Economic contracts are controlled only by the client. This is because scientific research and development done on contract with ministries, agencies, associations and organizations will be financed by clients.

Thus, a modern, developed form of economic contractual relations for scientific institutions in a unified system of socialist science is evolving in the country. This takes into account the specifics of the sphere of scientific institution functioning (the spheres are: academy, VUZ, sectoral, factory), and their connection with production (practical application).

The conversion of scientific institutions to the new conditions is simultaneous with the conversion of organizations and enterprises to full cost accounting and self-financing. There are also changes (since 1986) in payments for work by scientific workers; substantial material incentives have been introduced. A more effective method for the certification of science personnel is being created. A new labor payment system is being introduced through the planned wages fund at scientific institutions. The planning of the wages fund is directly linked to normatives of its formation (as a rule for a five year period), based upon the intended work volume. Payments to science workers are organically linked to the acceleration of progress in science. Quite substantial material incentives have been established for completing the most difficult and important work, taking into account individual contributions through savings in the wages and salaries fund. There is an increased incentives role for wages (there are minimum and maximum rates) and bonuses for contributions to scientific-technical progress. Bonuses are directly linked to the national economic effect from the work done, to reductions in the time needed for development and mastering the results. Science institutions have been given the right, previously given to production enterprises, to form funds (material incentives, social-cultural measures and housing construction). The sources for these funds are resources obtained from doing contractual work and intended for awarding bonuses to workers, savings in wages funds, resources allocated by production and scientific-technical production associations, enterprises and organizations from their similar funds during joint development and the introduction of equipment and technology meeting higher world standards. Moral incentives have also been established for scientific workers.

Scientific work done by institutions in the USSR Academy of Science (and apparently republic academies) on orders from all ministries, agencies, associations and enterprises is financed by contract at contractual prices. The latter include the necessary costs for the work, technical standards (competitiveness), difficulty, completion times, importance for the client and the profitability level. The difference between the contractual price and the actual costs to the developer are the latters' profits. Some money is allocated from profits to the budget (according to normatives for payments for capital, labor and other resources). The remaining profits are used to form economic incentives funds for scientific institutions and a centralized bonus fund at the presidia of the USSR and republic Academies of Science. Normatives for allocations from profits to funds (material incentives, social-cultural measures and housing construction, development and centralized bonuses funds) are determined by the presidia of the USSR and republic academies. These allocations are differentiated by group of scientific institutions, with a view to the nature and importance of their work.

State orders are financed through the state budget. The size of allocations is determined for each assignment throughout its entire implementation period. Basic research in the natural and social sciences and technology is financed from the state budget, according to established five year economic normatives. In our opinion, this will make it possible for the social sciences (where, under contemporary conditions is is more difficult to create works on a contractual, cost accounting basis) to do ordered work in philosophy, history, economics and other social sciences and humanities, to sign contracts (or work on state orders) between scientific institutions and ministries and agencies, specificially those in higher and secondary education, culture, finance, courts and procuracy and other organizations interested in theoretical and practical development, to assist in improving the skill levels of workers in these systems and in training new personnel, and in improving the operations in these agencies' institutions.

The economic mechanism for the operation of scientific organizations provided in the CPSU Central Committee and USSR Council of Ministers' decree "On the Conversion of Scientific Organizations to Full Cost accounting and Self-financing " is the same for all sectors of the national economy.

At a CPSU Central Committee meeting with managers of mass media, ideological institutions and creative unions, M. S. Gorbachev stressed: "We want the reform to grow so that we will get experience for science too." All this means that easy years are not ahead. This will be a time of intense, creative work, trials and errors, but this is the only path to take.

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12 May 1988